

INSTALLATION INSTRUCTIONS

80% Single Stage, Category I, Gas Furnace

N8MPN, N8MPL, C8MPN, H8MPN, T8MPN, C8MPL, H8MPL, T8MPL

(Upflow/Downflow/Horizontal)

These instructions must be read and understood completely before attempting installation.

Safety Labeling and Signal Words

DANGER, WARNING, CAUTION, and NOTE
The signal words **DANGER, WARNING, CAUTION,** and **NOTE** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING, CAUTION,** and **NOTE** will be used on product labels and throughout this manual and other manual that may apply to the product.

DANGER – Immediate hazards which will result in severe personal injury or death.

WARNING – Hazards or unsafe practices which could result in severe personal injury or death.

CAUTION – Hazards or unsafe practices which may result in minor personal injury or product or property damage.

NOTE – Used to highlight suggestions which will result in enhanced installation, reliability, or operation.

Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

▲ WARNING

The signal word **CAUTION** is used throughout this manual in the following manner:

▲ CAUTION

Signal Words on Product Labeling

Signal words are used in combination with colors and/or pictures or product labels.

▲ Safety-alert symbol

When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

▲ WARNING

PERSONAL INJURY, AND/OR PROPERTY DAMAGE HAZARD

Failure to carefully read and follow this warning could result in equipment malfunction, property damage, personal injury and/or death.

Installation or repairs made by unqualified persons could result in equipment malfunction, property damage, personal injury and/or death.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with proper tools and test instruments.

Installation must conform with local building codes and with the Natural Fuel Gas Code (NFCG) NFPA 54/ANSI Z223.1, and National standards of Canada CAN/CSA-B149.1 and .2 Natural Gas and Propane Installation Codes.

INSTALLER: Affix these instructions on or adjacent to the furnace.

CONSUMER: Retain these instructions for future reference.

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
Portions of the text and tables are reprinted from NFPA 54 /ANSI Z223.1-2009©, with permission of National Fire Protection Association, Quincy, MA 02269 and American Gas Association, Washington, DC 20001. This reprinted material is not the complete and official position of the NFPA or ANSI, on the referenced subject, which is represented only by the standard in its entirety.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes, the current editions of the National Fuel Gas Code (NFCG) NFPA 54/ANSI Z223.1, and the National Electrical Code (NEC) NFPA 70.

In Canada refer to the current editions of the National standards of Canada CAN/CSA-B149.1 and .2 Natural Gas and Propane Installation Codes, and Canadian Electrical Code CSA C22.1.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on unit, always turn off main power switch to unit and install lockout tag. Unit may have more than one power switch.



WARNING

CARBON MONOXIDE POISONING AND FIRE HAZARD

Failure to follow safety warnings could result in personal injury, death, and/or property damage.

This furnace is not designed for use in mobile homes, trailers or recreational vehicles.



CAUTION

CUT HAZARD

Failure to follow this caution may result in damage personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing furnaces.

START-UP CHECK SHEET

For 80+ Furnace

(This sheet is optional. Keep this page for future reference.)

Date of Start-Up: _____

Dealer Name: _____

Address: _____

City, State(Province), Zip or Postal Code: _____

Phone: _____

Owner Name: _____

Address: _____

City, State(Province), Zip or Postal Code: _____

Model Number: _____

Serial Number: _____

Setup Checks

Check the box when task is complete

Thermostat: Heat Cooling Fan

Subbase level:

Anticipator Set: Setting of Anticipator _____

All Electrical Connections Tight:

Supply voltage: _____

Blower Motor H.P.: _____

Fan "Time ON" setting: _____ Fan "Time OFF" Setting _____

Manual Gas Shut-Off Upstream of Furnace/Drip-Leg?

Gas Valve turned ON?

Type of Gas: Natural: Propane:

Filter Type and Size: _____

Calculated Firing Rate:(See *Checks and Adjustments* Section). _____

Heating Check

Measured Line Pressure when Firing Unit: _____

Measured Manifold Gas Pressure: _____

Temperature of Supply Air: (°)_____

Temperature of Return Air: (°)_____

Temperature Rise (supply-return temperature): (°)_____

In Rise (see furnace rating plate)? (°)_____

Static Pressure (Ducts): Supply Air _____ Return _____

Blower speed tap used for heating _____

Limit Opens: (°)_____ Limit Closes: (°)_____

Optional Check: CO ? _____ CO2 ? _____

Cooling Check

Temperature of Supply Air: (°)_____

Temperature of Return Air: (°)_____

Temperature Difference: (°)_____

Static Pressure (Ducts) cooling: Supply Air _____ Return _____

Blower Speed Tap used for cooling: _____

Dealer Comments: _____

1. Safe Installation Requirements



WARNING

FIRE, EXPLOSION, AND ASPHIXIATION HAZARD

Improper adjustment, alteration, service, maintenance or installation could cause personal injury, death, and/or property damage.

Installation or repairs made by unqualified persons could result in hazards to you and others. Installation MUST conform with local codes or, in the absence of local codes, with codes of all governmental authorities having jurisdiction.

The information contained in this manual is intended for use by a qualified service agency that is experienced in such work, is familiar with all precautions and safety procedures required in such work, and is equipped with the proper tools and test instruments.

NOTE: This furnace is design-certified by the CSA International (formerly AGA and CGA) for installation in the United States and Canada. Refer to the appropriate codes, along with this manual, for proper installation.

- Use only the Type of gas approved for this furnace (see **Rating Plate** on unit). Overfiring will result in failure of heat exchanger and cause dangerous operation. (Furnaces can be converted to Propane gas with approved kit.)
- Install this furnace only in a location and position as specified in "*Installation*" of these instructions.
- Provide adequate combustion and ventilation air to the furnace as specified in "*Combustion and Ventilation Air*" of these instructions.
- Combustion products must be discharged outdoors. Connect this furnace to an approved vent system only, as specified in "*Gas Vent Installation, Horizontal Venting and Masonry Chimney Venting*" of these instructions.
- Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified in "*Gas Supply and Piping, Final Check*" of these instructions.
- Always install furnace to operate within the furnace's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified in "*Technical Support Manual*" of these instructions. See furnace rating plate.
- When a furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by a duct(s) sealed to the furnace casing and terminating outside the space containing the furnace.
- A gas-fired furnace for installation in a residential garage must be installed as specified in "*Installation*" of these instructions.
- This furnace is not to be used for temporary heating of buildings or structures under construction.
- **This furnace is NOT approved for installation in mobile homes, trailers or recreation vehicles.**
- Seal around supply and return air ducts.
- Install correct filter type and size.

- Unit **MUST** be installed so electrical components are protected from direct contact with water.

Safety Rules

Your unit is built to provide many years of safe and dependable service providing it is properly installed and maintained. However, abuse and/or improper use can shorten the life of the unit and create hazards for you, the owner.

- A. The U.S. Consumer Product Safety Commission encourages installation of carbon monoxide alarms. There can be various sources of carbon monoxide in a building or dwelling. The sources could be gas-fired clothes dryers, gas cooking stoves, water heaters, furnaces, gas-fired fireplaces, wood fireplaces.

Carbon monoxide can cause serious bodily injury and/or death. Carbon monoxide or "CO" is a colorless and odorless gas produced when fuel is not burned completely or when the flame does not receive sufficient oxygen.

Therefore, to help alert people of potentially dangerous carbon monoxide levels, you should have a commercially available carbon monoxide alarm that is listed by a nationally recognized testing agency in accordance with Underwriters Laboratories Inc. Standard for Single and Multiple Station Carbon Monoxide Alarms, ANSI/UL 2034 or the CSA 6.19-01 Residential Carbon Alarming Devices installed and maintained in the building or dwelling concurrently with the gas-fired furnace installation (see Note below). The alarm should be installed as recommended by the alarm manufacturer's installation instructions.

- B. There can be numerous sources of fire or smoke in a building or dwelling. Fire or smoke can cause serious bodily injury, death, and/or property damage. Therefore, in order to alert people of potentially dangerous fire or smoke, you should have fire extinguisher and smoke alarms listed by Underwriters Laboratories installed and maintained in the building or dwelling (see Note below).

Note: The manufacturer of your furnace does not test any alarms and makes no representations regarding any brand or type of alarms.

- C. To ensure safe and efficient operation of your unit, you should do the following:
1. **Thoroughly read this manual and labels on the unit.** This will help you understand how your unit operates and the hazards involved with gas and electricity.
 2. **Do not use this unit if any part has been under water.** Immediately call a qualified service agency to inspect the unit and to replace any part of the control system and any gas control which has been under water.
 3. **Never obstruct the vent grilles, or any ducts that provide air to the unit.** Air must be provided for proper combustion and ventilation of flue gases.

Frozen Water Pipe Hazard



WARNING

WATER DAMAGE TO PROPERTY HAZARD

Failure to follow this warning could result in property damage.

Do not leave your home unattended for long periods during freezing weather without turning off water supply and draining water pipes or otherwise protecting against the risk of frozen pipes and resultant damage.

Your furnace is designed solely to provide a safe and comfortable living environment. The furnace is NOT designed to ensure that water pipes will not freeze. It is equipped with several safety devices that are designed to turn the furnace off and prevent it from restarting in the event of various potentially unsafe conditions.

If your furnace remains off for an extended time, the pipes in your home could freeze and burst, resulting in serious water damage. If the structure will be unattended during cold weather you should take these precautions.

1. Turn off the water supply to the structure and drain the water lines if possible and add an antifreeze for potable water to drain traps and toilet tanks. Open faucets in appropriate areas.

2. Installation

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

If this furnace is replacing a previously common-vented furnace, it may be necessary to resize the existing vent system to prevent oversizing problems for the other remaining appliances(s). See *Venting and Combustion Air Check* in the *Gas Vent Installation* section of this instruction.

Location and Clearances

If furnace is a replacement, it is usually best to install the furnace where the old one was. Choose the location or evaluate the existing location based upon the minimum clearance and furnace dimensions (**Figure 1** or **Figure 2**).

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

Do NOT operate furnace in a corrosive atmosphere containing chlorine, fluorine or any other damaging chemicals which could harm the furnace and vent system, and permit spillage of combustion products into an occupied space.

Refer to *Combustion & Ventilation Air* section, *Contaminated Combustion Air* for combustion air evaluation and remedy.

Installation Requirements

1. Install furnace level.
2. This furnace is **NOT** to be used for temporary heat of buildings or structures under construction.
3. Install furnace as centralized as practical with respect to the heat distribution system.
4. Install the vent pipes as short as practical. (See **Gas Vent Installation** section).
5. Do **NOT** install furnace directly on carpeting, tile or other combustible material other than wood flooring.
6. Maintain clearance for fire safety and servicing. A front clearance of 24" (609.6mm) required and 30" (762mm) is

–or–

2. Have someone check the structure frequently during cold weather to make sure it is warm enough to prevent pipes from freezing. Instruct them on a service agency to call to provide service, if required.

–or–

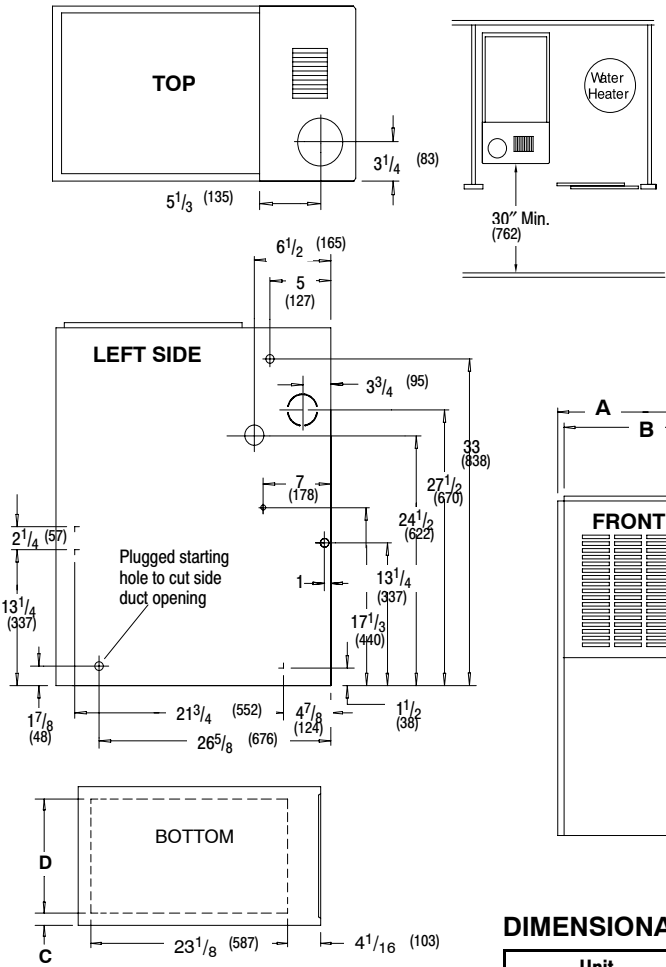
3. Install a reliable remote sensing device that will notify somebody of freezing conditions within the home.

recommended for access to the burner, controls and filter. See clearance requirements in **Figure 1** or **Figure 2**.

7. Use a raised base if the floor is damp or wet at times.
8. Residential garage installations require:
 - Burners and ignition sources installed at least 18" (457.2mm) above the floor.
 - Furnace must be located or physically protected from possible damage by a vehicle.
9. If the furnace is to be suspended from the floor joists in a basement or a crawl space or the rafters in an attic, it is necessary to use steel pipe straps or an angle iron frame to attach the furnace. These straps should be attached to the furnace bottom side with sheet metal screws and to the rafters or joists with bolts. The preferred method is to use an angle iron frame bolted to the rafters or joists.
10. This furnace may be used for construction heat provided that:
 - The furnace is permanently installed with all electrical wiring, piping, venting and ducting installed according to these installation instructions. A return air duct is provided, sealed to the furnace casing, and terminated outside the space containing the furnace. This prevents a negative pressure condition as created by the circulating air blower, causing a flame rollout and/or drawing combustion products into the structure.
 - The furnace is controlled by a thermostat. It may not be "hot wired" to provide heat continuously to the structure without thermostatic control.
 - Clean outside air is provided for combustion. This is to minimize the corrosive effects of adhesives, sealers and other construction materials. It also prevents the entrainment of drywall dust into combustion air, which can cause fouling and plugging of furnace components.
 - The temperature of the return air to the furnace is maintained between 55° F (13° C) and 80° F (27° C), with no evening setback or shutdown. The use of the furnace while the structure is under construction is deemed to be intermittent operation per our installation instructions.
 - The air temperature rise is within the rated rise range on the furnace rating plate, and the firing rate has been set to the rating plate value.
 - The filters used to clean the circulating air during the construction process must be either changed or thoroughly cleaned prior to occupancy.
 - The furnace, ductwork and filters are cleaned as necessary to remove drywall dust and construction debris from all HVAC system components after construction is completed.
 - Verify proper furnace operating conditions including ignition, gas input rate, air temperature rise, and venting according to these installation instructions.

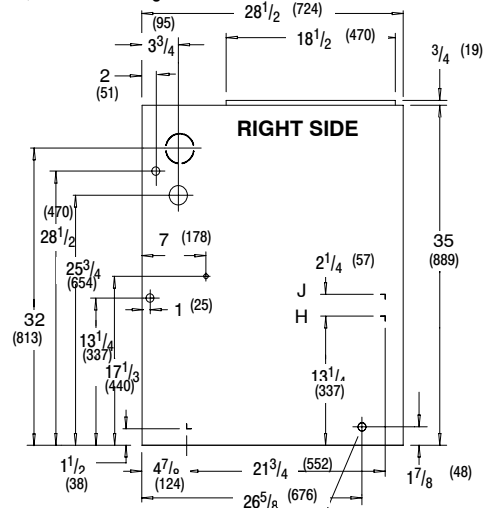
Figure 1

Dimensions and Clearances N8MPN/L



MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS FOR ALL UNITS	
REAR	0
FRONT (combustion air openings in furnace and in structure)	3" (76 mm)
Required For Service	*30" (762 mm)
ALL SIDES OF SUPPLY PLENUM	1" (25 mm)
SIDES	0
VENT	
Single Wall Vent	6" (152 mm)
Type B-1 Double Wall Vent	1" (25 mm)
TOP OF FURNACE	1" (25 mm)

Horizontal position: Line contact is permissible only between lines formed by intersections of top and two sides of furnace jacket, and building joists, studs or framing.



NOTE: Evaporator "A" coil drain pan dimensions may vary from furnace duct opening size. Always consult evaporator specifications for duct size requirements.
Unit is designed for bottom return or side return.
Return air through back of unit is NOT allowed.

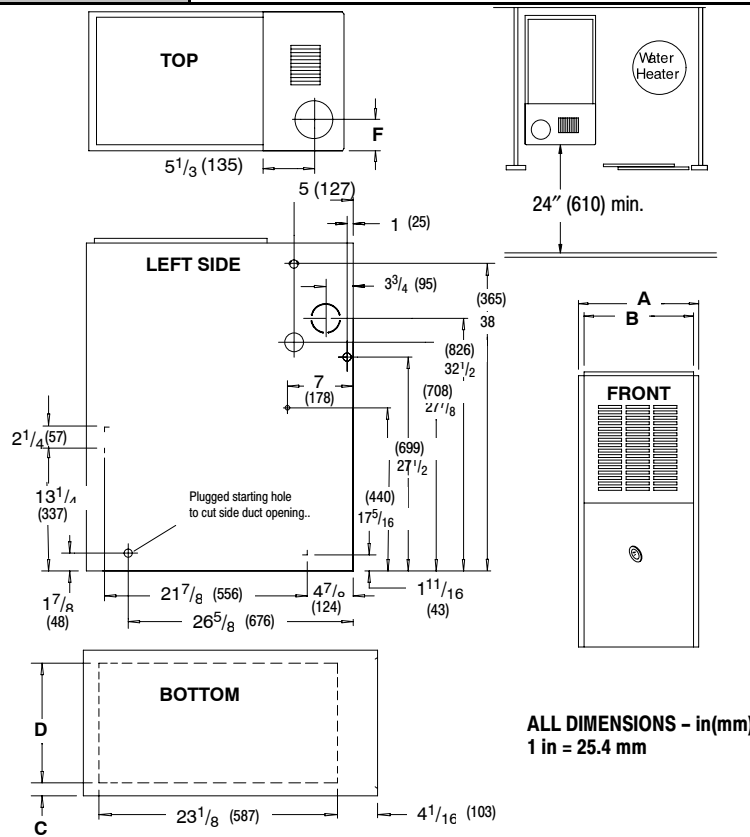
ALL DIMENSIONS in(mm)
1 in = 25.4 mm

DIMENSIONAL INFORMATION

Unit Capacity	Cabinet		Bottom		Duct Size
	A	B	C	D	
N8MPL050B12 N8MPL075B12	15 1/2 (76)	14 (356)	1 3/8 (1.4)	12 5/8 (321)	H
N8MPL075F16 N8MPL100F20	19 1/8 (486)	17 5/8 (447)	2 1/8 (54)	14 3/4 (15)	J
N8MPL100J22 N8MPL125J20 N8MPL125J22	22 3/4 (578)	21 1/4 (540)	1 5/16 (49)	18 3/4 (476)	J

Drawing is representative, but some models may vary.

Figure 2 Dimensions and Clearances *8MPN/L Models

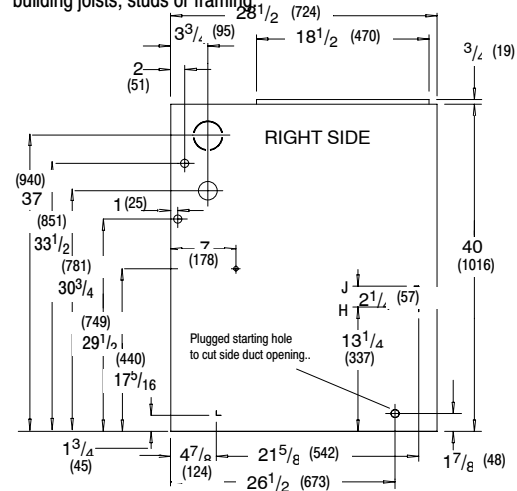


ALL DIMENSIONS - in(mm)
1 in = 25.4 mm

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS FOR ALL UNITS	
REAR	0
FRONT (combustion air openings in furnace and in structure)	3" (76 mm)
Required For Service	*24" (610 mm)
ALL SIDES OF SUPPLY PLENUM	1" (25 mm)
SIDES	0
VENT	
Single Wall Vent	6" (152 mm)
Type B-1 Double Wall Vent	1" (25 mm)
TOP OF FURNACE	1" (25 mm)

*30" (762 mm) clearance recommended for furnace removal.

Horizontal position: Line contact is permissible only between lines formed by intersections of top and two sides of furnace jacket, and building joists, studs or framing.



Furnace Capacity	Cabinet		Top	Bottom		Return Air Opening
	A	B	F	C	D	
*8MPL050B12 *8MPL075B12	15 1/2 (394)	14 (356)	6 (152)	1 3/8 (35)	12 5/8 (321)	H
*8MPL075F16 *8MPL100F20	19 1/8 (486)	17 1/2 (445)	7 3/4 (197)	2 1/8 (54)	14 3/4 (375)	J
*8MPL100J22 *8MPL125J20	22 3/4 (578)	21 1/4 (540)	9 1/2 (241)	1 5/16 (49)	18 3/4 (476)	J

* Denotes Brand (C, H, T)

NOTE: Evaporator "A" coil drain pan dimensions may vary from furnace duct opening size. Always consult evaporator specifications for duct size requirements.

Furnace is designed for bottom return or side return. Return air through back of furnace is NOT allowed.

Drawing is representative, but some models may vary.

Installation Positions

This furnace can be installed in an upflow, horizontal (either left or right) or downflow airflow position. DO NOT install this furnace on its back. For the upflow position, the return air ductwork can be attached to either the left or right side panel and/or the bottom. For horizontal and downflow positions, the return air ductwork must be attached to the bottom. The return air ductwork must **never** be attached to the back of the furnace.

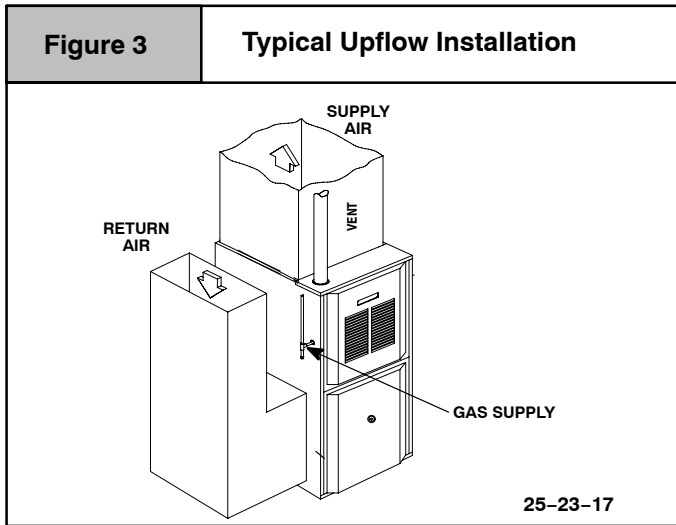
Furnace Installation

Inspect the rating plate to be certain the model number begins with "N8MP" or "*8MP". This identifies the unit as a multi-position furnace and can be installed in a Upflow, Horizontal Right, Horizontal Left or Downflow position.

* Denotes Brand (C, H, T)

Upflow

No modifications are required for upflow installation. (See **Figure 3**)

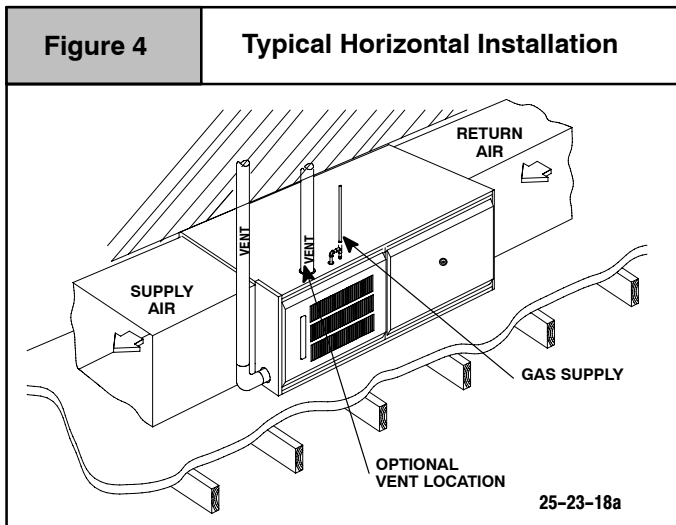


Horizontal

If you purchased a multi-position furnace, it can be installed horizontally in an attic, basement, crawl space, alcove, or suspended from a ceiling in a basement or utility room in either a right or left airflow position. (see **Figure 4**)

Horizontally installed furnaces may be vented out the top of the unit or out the side facing up. See “**Side venting**” for instructions to rotate the vent to the side.

The minimum clearances to combustibles **MUST** be maintained between the furnace and adjacent construction, as shown in **Figure 1** and **Figure 2**. **ONLY** the corner of the cabinet is allowed to contact the rafters as shown in **Figure 4**. All other clearances **MUST** be observed as shown in **Figure 1** and **Figure 2**.



If the furnace is to be suspended from the floor joists in a basement or crawl space or the rafters in an attic, it is necessary to use steel pipe straps or an angle iron frame to attach the furnace. These straps should be attached to the furnace bottom side with sheet metal screws and to the rafters or joists with bolts. The preferred method is to use an angle iron frame bolted to the rafters or joists.

If the furnace is to be installed at ground level in a crawl space, consult local codes. A concrete pad 1” to 2” (25.4 to 50.8mm) thick is recommended.

24” (609.6mm) is required between the front of the furnace and adjacent construction or other appliances. This should be maintained for service clearance.

Keep all insulating materials clear from louvered door. Insulating materials may be combustible.

The horizontal furnaces may be installed directly on combustible wood flooring or supports, however, it is recommended for further fire protection cement board or sheet metal is placed between the furnace and the combustible wood floor and extend 12” (304.8mm) beyond the front of the furnace louver door. (This is a recommendation only, not a requirement).

This furnace **MUST NOT** be installed directly on carpeting, tile or other combustible material other than wood flooring or supports.

Downflow

	WARNING
FIRE HAZARD	
<p>Failure to follow this warning could result in personal injury, death and/or property damage.</p> <p>Place furnace on noncombustible subbase on downflow applications, unless installing on noncombustible flooring.</p>	

If you purchased a Multi-position furnace (N8MP or *8MP) it may be installed in a downflow configuration, (see **Figure 5**). The minimum clearances to combustible material **MUST** be maintained between the furnace and adjacent construction, as shown in **Figure 1** and **Figure 2**.

In addition to clearances in **Figure 1** and **Figure 2**, clearance for the vent pipe must be considered.

A subbase for combustible floors **MUST** be used when the furnace is installed as a downflow on combustible material. See “*Ductwork and Filter*” (Downflow Section). The outlet flange must be bent flat for downflow installation.

When installing a four-position furnace in the downflow position (not the *8DNL furnace), the logo is to be repositioned so that it is rightside-up as follows:

T8MPN/L

1. Find the door hardware kit that is stored in the furnace and save it.
2. Carefully remove logo from the outside of burner compartment door and save it.
3. Carefully remove two small plug buttons from outside of blower compartment door and save them.
4. Remove two thumbscrews from blower compartment door .
5. Install two thumbscrews in holes at other end of blower compartment door from where thumbscrews were removed.
6. Install new strip of rubber gasket on inside of blower compartment door on edge that does not already have a gasket.
7. Install logo retainer pins into holes in blower compartment door from which plug buttons were removed.
8. Install plug buttons into holes in burner compartment door from which logo was removed.
9. Install blower compartment door on furnace with bevel edge and logo at top.
10. Install burner compartment door on furnace with bevel edge at bottom.

N8MPN/L, C8MPN/L, H8MPN/L

1. Carefully remove logo from burner compartment door and save it.

2. Turn the logo rightside-up, and install the logo retainer pins into holes in burner compartment door.
3. New labels for rightside-up application on outside of blower compartment door may be purchased in a kit from your distributor to cover upside-down labels.

Downflow Venting: The combustion venter **MUST** be rotated to vent out the side for all downflow installations, (see **Figure 5**). Bottom venting is not permitted. See “**Side venting**” for instructions to rotate the vent to the side. In addition to rotating the vent to the side a **Vent Pipe Shield (NAHA002VC)** is required to shield the hot vent pipe.

⚠ WARNING

BURN HAZARD

Failure to follow this warning could result in personal injury and/or property damage.

Vent pipe is **HOT** and could cause personal injury. Hot vent pipe is in reach of small children when installed in downflow position.

Install vent pipe shield NAHA002VC.

Pressure Switch Relocation

If the furnace is installed in the upflow position, the pressure switch will remain in the same position as installed by the factory unless the inducer is rotated. If the furnace is installed in an orientation that places the pressure switch below the pressure tap on the inducer housing, then the switch **MUST** be relocated. In order to relocate the switch, locate 2 mounting holes or drill above the inducer pressure tap. When drilling the 2 holes make sure to keep

3. Side Venting

This furnace is shipped from the factory with the venter assembly in an upflow configurations (top vent). The venter assembly can easily be rotated to a side vent configuration for use in upflow, horizontal-flow, or downflow application.

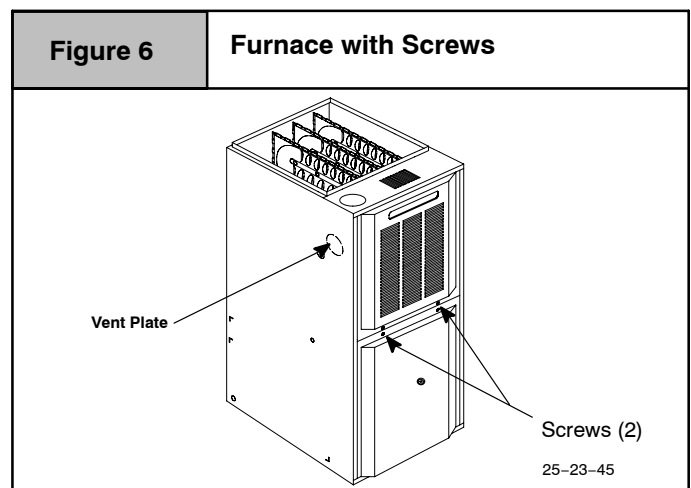
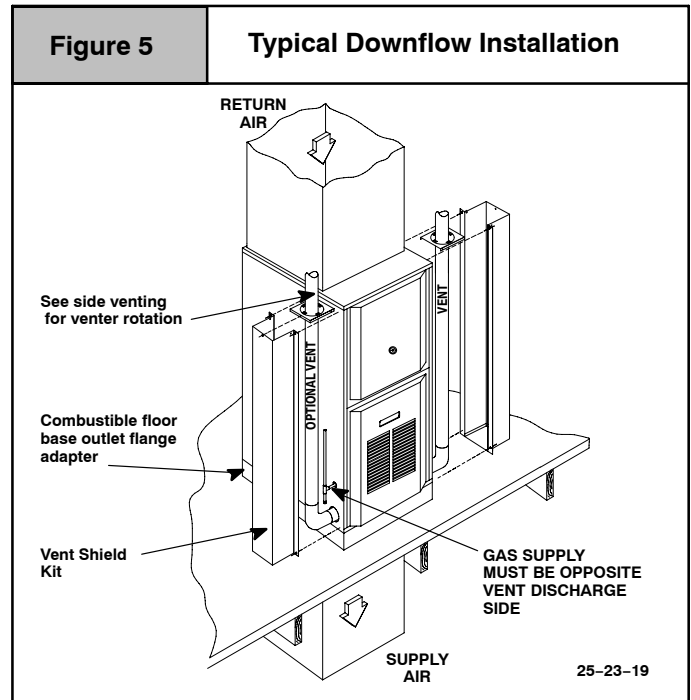
When using a side vent configuration (side outlet instead of top outlet), it may be necessary to relocate the pressure switch to the alternate position on the opposite side of the top panel. Two screw holes are provided at the alternate position. Route the pressure switch tubing so the tubing is not kinked and not touching the hot collector box, venter housing, or motor. It may be necessary to shorten the length of the tubing to properly route the tubing and eliminate kinks.

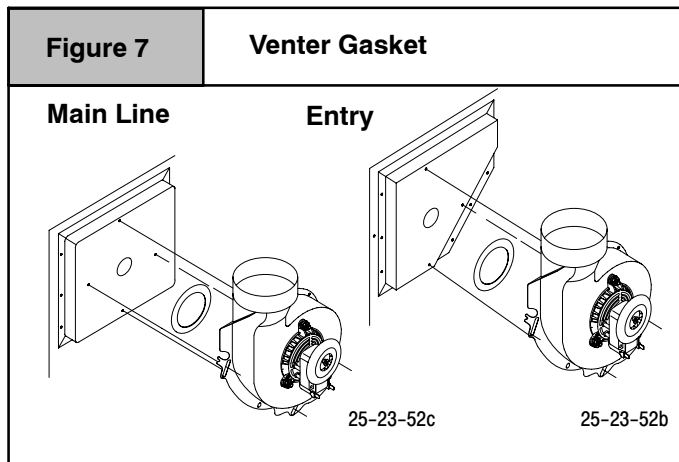
Rotating the Venter Assembly

1. If gas and electrical power have already been connected to unit shut off gas and remove power from unit. Unscrew screws on burner compartment door and remove burner compartment door. (see **Figure 6**).
2. Disconnect power leads to the venter motor and hose to pressure switch. Remove three (3) or four (4) screws which secure the venter to the collector box, (see **Figure 7**).
3. Cut webbing with a pair of snips holding the vent plate to the cabinet on either the left or right side of unit depending on right or left venting as desired. Discard vent plate, (see **Figure 6**).
4. Replace venter gasket (part # 1013540, if needed) to venter assembly with adhesive in the same location as the old one.
5. Clip the wire tie for the venter wires, if needed.
6. Rotate venter assembly 90° right or left from original location depending on venting configurations.

the switch and tubing far enough away from the burners or hot surfaces as to not melt the hose, switch, or wires. To prevent possible kinking of the pressure switch hose, trim the hose to remove excess length.

Note: When drilling new holes make sure metal shavings do not fall on or in components, as this can shorten the life of the furnace.





- Tighten the three (3) or four (4) screws that secure the venter assembly to the collector box. Do not tighten screws enough to compress venter gasket.
- Replace power leads to venter motor and reconnect hose to pressure switch.

NOTE: Unused open vent hole must be covered. A Vent Cover is supplied with Vent Pipe Shield Kit NAHA002VC. A 5⁵/₁₆" (135mm) diameter Vent Cover is available separately from your distributor, or one can be fabricated with sheet metal for all side vent installations.

4. Combustion & Ventilation Air

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

Use methods described here to provide combustion and ventilation air.

Furnaces require ventilation openings to provide sufficient air for proper combustion and ventilation of flue gases. All duct or openings for supplying combustion and ventilation air must comply with the gas codes, or in the absence of local codes, the applicable national codes.

Combustion and ventilation air must be supplied in accordance with one of the following:

Note: The Combustion & Ventilation Air Section, in this document, uses tables and information from the ANSI Z223.1/NFPA 54-2009. For use in Canada, use CSA B149.1 for this information.

- Section 9.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, (NFGC), ANSI Z223.1/NFPA 54-2009 in the U.S.,
- Sections 8.2, 8.3, 8.5, 8.6, 8.7, and 8.8 of National Standard of Canada, Natural Gas and Propane Installation Code (NSCNGPIC), CSA B149.1-05 in Canada,
- Applicable provisions of the local building code.

When the installation is complete, check that all appliances have adequate combustion air and are venting properly. See *Venting And Combustion Air Check* in "Gas Vent Installation" Section in this manual.

Contaminated Combustion Air

Installations in certain areas or types of structures could cause excessive exposure to contaminated air having chemicals or halogens that will result in safety and performance related problems and may harm the furnace. These instances must use only outdoor air for combustion.

The following areas or types of structures may contain or have exposure to the substances listed below. The installation must be

evaluated carefully as it may be necessary to provide outdoor air for combustion.

- Commercial buildings.
- Buildings with indoor pools.
- Furnaces installed in laundry rooms.
- Furnaces installed in hobby or craft rooms.
- Furnaces installed near chemical storage areas.
- Permanent wave solutions for hair.
- Chlorinated waxes and cleaners.
- Chlorine based 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.
- Sulfuric Acid.
- Solvent cements and glues.
- Antistatic fabric softeners for clothes dryers.
- Masonry acid washing materials.

Outdoor Combustion Air Method

A space having less than 50 cubic feet per 1,000 BTUH (4.8 cubic meters per kW) input rating for all gas appliances installed in the space requires outdoor air for combustion and ventilation.

Air Openings and Connecting Ducts

- Total input rating for all gas appliances in the space **MUST** be considered when determining free area of openings.
- Connect ducts or openings directly to the outdoors.
- When screens are used to cover openings, the openings **MUST** be no smaller than 1/4" (6.4mm) mesh.
- The minimum dimension of air ducts **MUST NOT** be less than 3" (76.2mm).
- When sizing a grille, louver or screen use the free area of opening. If free area is **NOT** stamped or marked on grill or louver, assume a 20% free area for wood and 60% for metal. Screens shall have a mesh size not smaller than 1/4" (6.4mm).

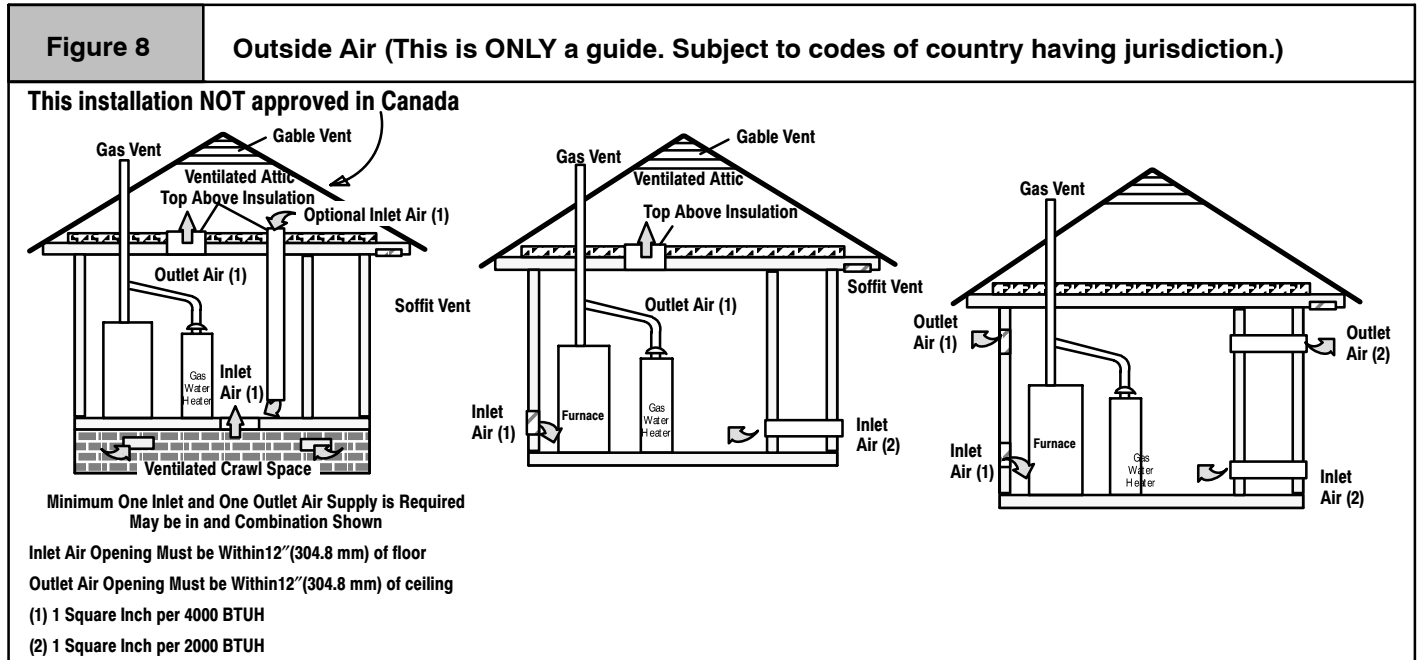
Requirements

- Provide the space with sufficient air for proper combustion and ventilation of flue gases using horizontal or vertical ducts or openings.

2. **Figure 8** illustrates how to provide combustion and ventilation air when two permanent openings, one inlet and one outlet, are used.
- One opening **MUST** commence within 12" (304.8mm) of the floor and the second opening **MUST** commence within 12" (304.8mm) of the ceiling.
 - Size openings and ducts per **Table 1**.
 - Horizontal duct openings require 1 square inch of free area per 2,000 BTUH (11 cm²/kW) of combined input for all gas appliances in the space (see **Table 1**).
 - Vertical duct openings or openings directly

communicating with the outdoors require 1 square inch of free area per 4,000 BTUH (5.5 cm²/kW) for combined input of all gas appliances in the space (see **Table 1**).

- When one permanent outdoor opening is used, the opening requires:
 - 1 sq. in. of free area per 3,000 BTUH (7 cm²/kW) for combined input of all gas appliances in the space (see **Table 1**) and
 - Not less than the sum of the areas of all vent connectors in the space.



The opening shall commence within 12" (304.8mm) of the top of the enclosure. Appliances shall have clearances of at least 1" (25.4mm) from the sides and back and 6" (152.4mm) from the front. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

- Combination of Indoor and Outdoor Air shall have:
 - Indoor openings that comply with the **Indoor Combustion Air Method** below and

- Outdoor openings located as required in the **Outdoor Combustion Air Method** above and
- Outdoor openings sized as follows.
 - Calculate the **Ratio** of all Indoor Space volume divided by required volume for **Indoor Combustion Air Method**. Outdoor openings sized as follows.
 - Outdoor opening size reduction **Factor** is 1 minus the **Ratio** in 1) above.
 - Minimum size of Outdoor openings shall be the size required in **Outdoor Combustion Air Method** above multiplied by reduction **Factor**.

Table 1		Free Area			
BTUH (kW) Input Rating	Minimum Free Area Required for Each Opening or Duct to Outdoors				
	Two Horizontal Ducts BTUH (kW) sq. in./2,000(1 cm ² /.09)	Single Opening BTUH (kW) sq. in./3,000 (1 cm ² /.135)	Two Vertical Ducts or Openings BTUH (kW) sq. in./4,000(1 cm ² /.18)	Round Duct BTUH (kW) sq. in./4,000(6.5cm ² /.18)	
50,000 (14.65)	25 sq. in. (161 cm ²)	16.7 sq. in. (108 cm ²)	12.5 sq. in. (81 cm ²)	4" (101.6mm)	
75,000 (21.98)	37.5 sq. in. (242 cm ²)	25 sq. in. (161 cm ²)	18.75 sq. in. (121 cm ²)	5" (127mm)	
100,000 (29.31)	50 sq. in. (322 cm ²)	33.3 sq. in. (215 cm ²)	25 sq. in. (161 cm ²)	6" (152.4mm)	
125,000 (36.63)	62.50 sq. in. (403 cm ²)	41.7 sq. in. (269 cm ²)	31.25 sq. in. (202 cm ²)	7" (177.8mm)	
150,000 (43.95)	75 sq. in. (484 cm ²)	50 sq. in. (322 cm ²)	37.5 sq. in. (242 cm ²)	7" (177.8mm)	

EXAMPLE: Determining Free Area

Furnace	Water Heater		Total Input	
100,000	30,000	=	(130,000 ÷ 4,000)	= 32.5 Sq. In. Vertical
29.31	8.8		(38.11 ÷ .18)	= 210 cm ² Vertical
Furnace	Water Heater		Total Input	
100,000	30,000	=	(130,000 ÷ 2,000)	= 65 Sq. In. Horizontal
29.31	8.8		(38.11 ÷ .09)	= 423 cm ² Horizontal

Indoor Combustion Air

Standard and Known-Air-Infiltration Rate Methods

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Indoor air is permitted for combustion and ventilation, if the Standard or Known-Air-Infiltration Rate Method is used.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

Most homes will require additional air from outdoors for combustion and ventilation. A space with at least 50 cubic feet per 1,000 BTUH (1.4 cubic meters per .293 kW/h) input rating or homes with tight construction may need outdoor air to supplement air infiltration for proper combustion and ventilation of flue gases.

The **Standard** Method may be used, if the space has no less volume than 50 cubic feet per 1,000 BTUH (4.8 cubic meters per kW) of the maximum input ratings for all gas appliances installed in the space. The **standard** method permits indoor air to be used for combustion and ventilation air.

The **Known Air Infiltration Rate** Method shall be used if the infiltration rate is known to be less than 0.40 air changes per hour (ACH) and equal to or greater than 0.10 ACH. Infiltration rates greater than 0.60 ACH shall not be used. The minimum required volume of the space varies with the number of ACH and shall be determined per **Table 2** or **Equations 1 and 2**. Determine the minimum required volume for each appliance in the space, and add the volumes together to get the total minimum required volume for the space.

Table 2	MINIMUM SPACE VOLUME FOR 100% COMBUSTION AND VENTILATION AIR FROM INDOORS							
	Other Than Fan-Assisted Total			Fan-assisted Total				
ACH	30,000 BTU (8.79 kW)	40,000 BTU (11.72 kW)	50,000 BTU (14.65 kW)	50,000 BTU (14.65 kW)	75,000 (21.98 kW)	100,000 BTU (29.30 kW)	125,000 BTU (36.63 kW)	150,000 BTU (43.95 kW)
	ft ³ (m ³)							
0.60	1,050 (29.7)	1,400 (39.2)	1,750 (49)	1,250 (35)	1,875 (52.5)	2,500 (70)	3,125 (87.5)	3,750 (105)
0.50	1,260 (35.3)	1,680 (47.04)	2,100 (58.8)	1,500 (42)	2,250 (63)	3,000 (84)	3,750 (105)	4,500 (126)
0.40	1,575 (44.1)	2,100 (58.8)	2,625 (73.5)	1,875 (52.5)	2,813 (78.8)	3,750 (105)	4,688 (131.3)	5,625 (158)
0.30	2,100 (58.8)	2,800 (78.4)	3,500 (98)	2,500 (70)	3,750 (105)	5,000 (140)	6,250 (175)	7,500 (210.6)
0.20	3,150 (88.2)	4,200 (117.6)	5,250 (147)	3,750 (105)	5,625 (157.5)	7,500 (210)	9,375 (262.5)	11,250 (316)
0.10	6,300 (176.4)	8,400 (235.2)	10,500 (294)	7,500 (210)	11,250 (315)	15,000 (420)	18,750 (525)	22,500 (632)
0.00	NP	NP	NP	NP	NP	NP	NP	NP

NP = Not Permitted

Table 2 Minimum Space Volumes were determined by using the following equations from the National Fuel Gas Code ANSI Z223.1/NFPA 54-2009, 9.3.2.2:

- For **other than fan-assisted appliances** such as a draft hood-equipped water heater,

$$\text{Volume}_{\text{other}} = \frac{21 \text{ ft}^3}{\text{ACH}} \left(\frac{I_{\text{other}}}{1000 \text{ Btu/hr}} \right)$$

$$\text{Required Volume}_{\text{other}} \geq \frac{59 \text{ m}^3}{\text{ACH}} \left(\frac{I_{\text{other}}}{.293 \text{ kW/hr}} \right)$$

- For **fan-assisted appliances** such as this furnace,

$$\text{Volume}_{\text{fan}} = \frac{15 \text{ ft}^3}{\text{ACH}} \left(\frac{I_{\text{fan}}}{1000 \text{ Btu/hr}} \right)$$

$$\text{Required Volume}_{\text{fan}} \geq \frac{.42 \text{ m}^3}{\text{ACH}} \left(\frac{I_{\text{fan}}}{.293 \text{ kW/hr}} \right)$$

If:

I_{other} = combined input of all **other than fan-assisted appliances** in Btu/hr

I_{fan} = combined input of all **fan-assisted appliances** in Btu/hr

ACH = air changes per hour (ACH shall not exceed 0.60.)

The following requirements apply to the **Standard** Method and to the **Known Air Infiltration** Rate Method.

- Adjoining rooms can be considered part of a space, if there are no closable doors between rooms.
- An attic or crawl space may be considered a space that freely communicates with the outdoors provided there are adequate ventilation openings directly to outdoors. Openings **MUST** remain open and **NOT** have any means of being closed off. Ventilation openings to outdoors **MUST** be at least 1 square inch of free area per 4,000 BTUH (5.5 cm²/kW) of total input rating for all gas appliances in the space.
- In spaces that use the **Indoor Combustion Air** Method, infiltration should be adequate to provide air for combustion, ventilation and dilution of flue gases. However, in buildings with unusually tight construction, additional air **MUST** be provided using the methods described in section titled **Outdoor Combustion Air Method**:
- Unusually tight construction is defined as Construction with:
 - Walls and ceilings exposed to the outdoors have a continuous, sealed vapor barrier. Openings are gasketed or sealed and
 - Doors and openable windows are weather stripped and
 - Other openings are caulked or sealed. These include joints around window and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical and gas lines, etc.

Ventilation Air

Some provincial codes and local municipalities require ventilation or make-up air be brought into the conditioned space as replacement air. Whichever method is used, the mixed return air

temperature across the heat exchanger **MUST** not fall below 60° F (16° C) continuously, or 55° F (13° C) on an intermittent basis so that flue gases will not condense excessively in the heat exchanger. Excessive condensation will shorten the life of the heat exchanger and possibly void your warranty.

5. Gas Vent Installation

⚠ WARNING
CARBON MONOXIDE POISONING, FIRE AND EXPLOSION HAZARD
Failure to follow this warning could result in personal injury, death, and/or property damage.
Read and follow all instructions in this section.

Install the vent in compliance with codes of the country having jurisdiction, local codes or ordinances and these instructions.

This Category I furnace is fan-assisted.

Category I furnace definition: A central furnace which operates with a non-positive vent static pressure and with a flue loss not less than 17 percent. These furnaces are approved for common-venting and multi-story venting with other fan-assisted or draft hood-equipped appliances in accordance with the NFGC or NSCNPGIC

Category I Safe Venting Requirements

Category I furnace vent installations shall be in accordance with Parts 12 and 13 of the National Fuel Gas Code (NFGC), ANSI Z223.1/NFPA 54-2009; and/or Section 8 and Appendix C of the CSA B149.1-05, National Standard of Canada, Natural Gas and Propane Installation Code; the local building codes; furnace and vent manufacturer's instructions.

NOTE: The following instructions comply with the ANSI Z223.1/NFPA 54-2009 National Fuel Gas Code and CSA B149.1 Natural Gas and Propane Installation code, based on the input rate on the furnace rating plate.

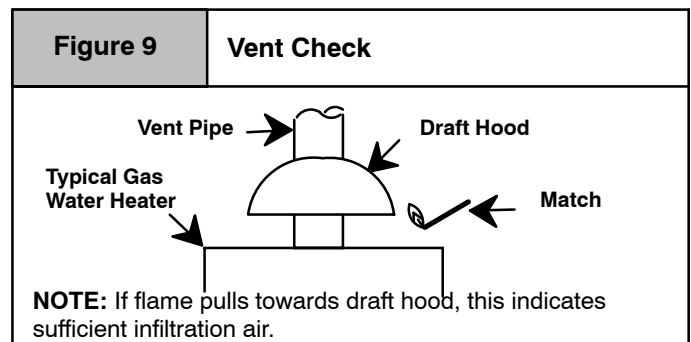
1. If a Category I vent passes through an attic, any concealed space or floor, use **ONLY** Type B or Type L double wall vent pipe. If vent pipe passes through interior wall, use Type B vent pipe with ventilated thimble **ONLY**.
2. Do **NOT** vent furnace into any chimney serving an open fireplace or solid fuel burning appliance.
3. Use the same diameter Category I connector or pipe as permitted by:
 - the **National Fuel Gas Code** Code ANSI Z223.1/ NFPA 54-2009 Sections 12 and 13 venting requirements in the United States
 - or
 - the National Standard of Canada **Natural Gas and Propane Installation Code** (NSCNPGIC) CSA B149.1-05 Section 8 and appendix C venting requirements in Canada.
4. Push the vent connector onto the furnace flue collar of the venter assembly until it touches the bead [at least $\frac{5}{8}$ "

(15.9mm) overlap] and fasten with at least two field-supplied, corrosion-resistant, sheet metal screws located at least 140° apart.

5. Keep vertical Category I vent pipe or vent connector runs as short and direct as possible.
6. Vertical outdoor runs of Type-B or **ANY** single wall vent pipe below the roof line are **NOT** permitted.
7. Slope all horizontal runs up from furnace to the vent terminal a minimum of $\frac{1}{4}$ " per foot (10mm/m).
8. Rigidly support all horizontal portions of the venting system every 6' or less using proper clamps and metal straps to prevent sagging and ensure there is no movement after installation.
9. Check existing gas vent or chimney to ensure they meet clearances and local codes. See **Figure 1**
10. The furnace **MUST** be connected to a factory built chimney or vent complying with a recognized standard, or a masonry or concrete chimney lined with a lining material acceptable to the authority having jurisdiction. **Venting into an unlined masonry chimney or concrete chimney is prohibited. See the 6. Masonry Chimney Venting section in these instructions.**
11. Fan-assisted combustion system Category I furnaces shall not be vented into single-wall metal vents.
12. Category I furnaces must be vented vertically or nearly vertically, unless equipped with a listed mechanical venter.
13. Vent connectors serving Category I furnaces shall not be connected into any portion of mechanical draft systems operating under positive pressure.

Venting and Combustion Air Check

NOTE: When an existing Category I furnace is removed or replaced, the original venting system may no longer be sized to properly vent the attached appliances, and to make sure there is adequate combustion air for all appliances, **MAKE THE FOLLOWING CHECK.**





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 venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* or *CSA B149.1, Natural Gas and Propane Installation Code* and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.
4. Close fireplace dampers.
5. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.
6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
7. Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle. (Figure 9)
8. If improper venting is observed, during any of the above tests, the venting system must be corrected in accordance with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* and/or *CSA B149.1, Natural Gas and Propane Installation Code*.
9. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

6. Horizontal Venting

Category I Furnaces With External Power Venters

In order to maintain a Category I classification of fan-assisted furnaces when vented horizontally with sidewall termination, a power venter is **REQUIRED** to maintain a negative pressure in the venting system.

In the U.S.: Per the NFGC, a listed power venter may be used, when approved by the authority having jurisdiction.

In Canada: Only power venters approved by the power venter manufacturer and where allowed by the authority having jurisdiction may be used.

Please consult the Fields Controls Co. or Tjernlund Products, Inc. for power venters certified for use with our furnaces.

Venting to Existing Masonry Chimney

Dedicated venting of one fan assisted furnace into any masonry chimney is restricted. A chimney must first be lined with either Type B vent sized in accordance with ANSI Z223.1/NFPA-2009 tables 13.1a or 13.1b or a listed metal lining system. (See *Masonry Chimney Venting* of these instructions.)

Listed, corrugated metallic chimney liner systems in masonry chimneys shall be sized by using ANSI Z223.1/NFPA-2009 section 13.1.7 for dedicated venting and 13.2.20 for common venting with the maximum capacity reduced by 20% (0.80 X maximum capacity) and the minimum capacity as shown in the applicable table. In Canada, use the CSA B149.1-05 Natural Gas and Propane Installation Code, appendix C, Section 10. Corrugated metal vent systems installed with bends or offsets require additional reduction of 5% of the vent capacity for each bend up to 45° and 10% of the vent capacity for each bend from 45° up to 90°.

NOTE: Two (2) 45° elbows are equivalent to one (1) 90° elbow.

Combined Venting into a Masonry Chimney

Venting into a masonry or concrete chimney is only permitted as outlined in the NFGC or NSCNPIC venting tables. Follow all safe venting requirements.

Note: See section "Masonry Chimney Venting".

Vent Termination

Venting Through a Non-Combustible and Combustible Wall

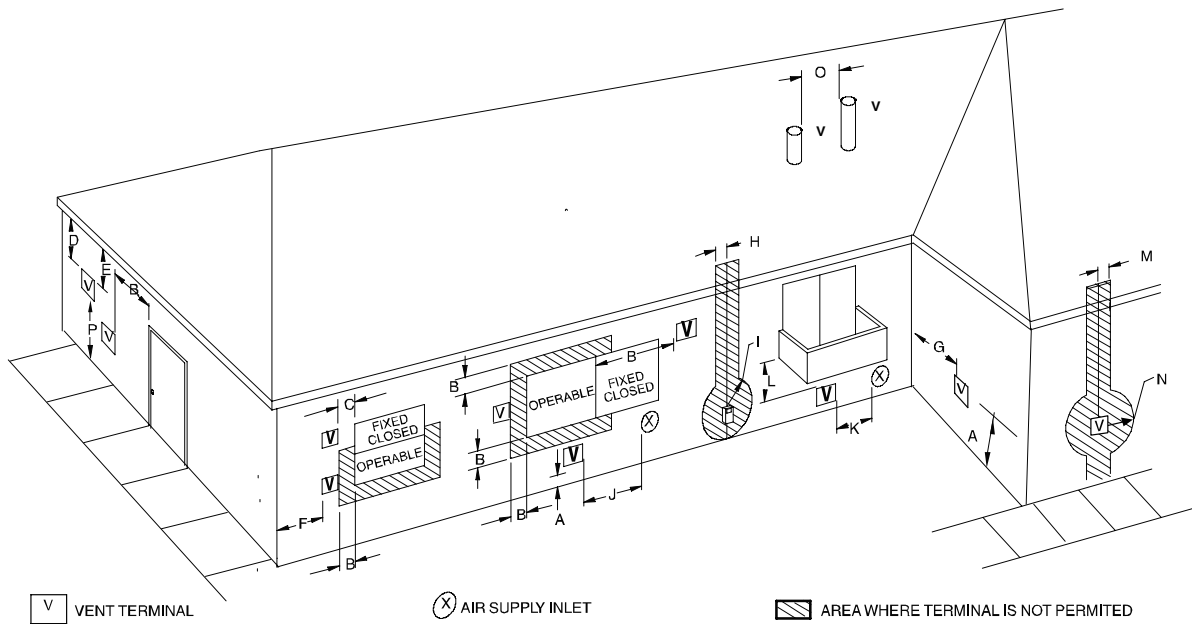
Consult External Power Venter manufacturer instructions.

Select the power venter to match the Btuh input of the furnace being vented. Follow all of the Power Venter manufacturer's installation requirements included with the power venter for:

- venting installation,
- vent terminal location,
- preventing blockage by snow,
- protecting building materials from degradation by flue gases,
- see **Figure 10** for required vent termination.

NOTE: It is the responsibility of the installer to properly terminate the vent and provide adequate shielding. This is essential in order to avoid water/ice damage to building, shrubs and walkways.

Figure 10 Other than Direct Vent Termination Clearance



Item	Clearance Descriptions	Canadian Installation (1)	U.S. Installation (2)
A	Clearance above grade, veranda, porch, deck, balcony, or anticipated snow level	12" (30cm) #	12" (30 cm)
B	Clearance to a window or door that may be opened	12" (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36" (91 cm) for appliances > 100,000 Btuh (30 kW)	4' (1.2 m) below or to the side of the opening. 1' (30 cm) above the opening.
C	Clearance to a permanently closed window	*	*
D	Vertical clearance to a ventilated soffit located above the terminal within a horizontal distance of 2' (61cm) from the centerline of the terminal	*	*
E	Clearance to an unventilated soffit	*	*
F	Clearance to an outside corner	*	*
G	Clearance to an inside corner	*	*
H	Clearance to each side of the centerline extended above electrical meter or gas service regulator assembly	3' (91 cm) within 15' (4.5 m) above the meter/regulator assembly	3' (91 cm) within 15' (4.5 m) above the meter/regulator assembly
I	Clearance to service regulator vent outlet	3' (91 cm)	*
J	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	12" (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36" (91 cm) for appliances > 100,000 Btuh (30 kW)	4' (1.2 m) below or to the side of opening; 1' (30 cm) above opening.
K	Clearance to a mechanical air supply inlet	6' (1.83 m)	3' (91 cm) above if within 10' (3m) horizontally
L	Clearance under a veranda, porch, deck, or balcony	12" (30 cm)+	*
M	Clearance to each side of the centerline extended above or below vent terminal of the furnace to a dryer or water heater vent, or other appliance's direct vent intake or exhaust.	*	*
N	Clearance to the vent terminal of a dryer vent, water heater vent, or other appliances direct vent intake or exhaust.	*	*
O	Clearance from a plumbing vent stack	*	*
P	Clearance above a paved sidewalk or paved driveway located on public property.	7' (2.13 m) **	7' (2.13 m)

> greater than, ≥ greater than or equal to, < less than, ≤ less than or equal to

(1) In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code

(2) In accordance with the current ANSI Z223.1/NFPA 54, National Fuel Gas Code

18" (46 cm) above roof surface

+ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

* For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, clearances shall be in accordance with local installation codes and the requirements of the gas supplier and the manufacturer's installation instructions.

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

Notes:

1. The vent for this appliance shall not terminate
 - a. Over public walkways; or
 - b. Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or property damage; or
 - c. Where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.
2. When locating vent terminations, consideration must be given to prevailing winds, location, and other conditions which may cause recirculation of the combustion products of adjacent vents. Recirculation can cause poor combustion, inlet condensate problems, and accelerated corrosion of the heat exchangers.
3. Avoid venting under a deck or large overhang. Recirculation could occur and cause performance or system problems.

7. Masonry Chimney Venting

Chimney Inspection

All masonry chimney construction must conform to Standard ANSI/NFPA 211–2006 and to any state or local codes applicable. The chimney must be in good condition and a complete chimney inspection must be conducted prior to furnace installation. If the inspection reveals damage or abnormal conditions, make necessary repairs or seek expert help. See **Figure 11** “The Chimney Inspection Chart”. Measure inside area of tile–liner and exact height of chimney from the top of the chimney to the highest appliance flue collar or draft hood outlet.

Connector Type

To reduce flue gas heat loss and the chance of condensate problems, the vent connector must be double–wall Type B vent.

Venting Restrictions for Chimney Types

Interior Chimney – has no sides exposed to the outdoors below the roofline. All installations can be single furnace or common vented with another draft hood equipped Category I appliance.

Exterior Chimney – has one or more sides exposed to the outdoors below the roof line. All installations with a 99% Winter Design Temperature* below 17°F(–8°C) must be common vented only with a draft hood equipped Category I appliance.

* The 99% Winter Design Dry–Bulb (db) temperatures are found in the 2005 ASHRAE Fundamentals Handbook CD and Chapter 28.

⚠ WARNING

CARBON MONOXIDE POISONING, FIRE AND EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

These furnaces are CSA (formerly AGA and CGA) design–certified for venting into exterior clay tile–lined masonry chimneys with a factory accessory Chimney Adapter Kit. Refer to the furnace rating plate for correct kit usage. The Chimney Adapter Kits are for use with ONLY furnaces having a Chimney Adapter Kit number marked on the furnace rating plate.

If a clay tile–lined masonry chimney is being used and it is exposed to the outdoors below the roof line, relining might be required.

Chimneys shall conform to the Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances ANSI/NFPA 211–2006 in the United States and to a Provincial or Territorial Building Code in Canada (in its absence, the National Building Code of Canada) and must be in good condition.

U.S.A.–Refer to Sections 13.1.9 or 13.2.22 of the ANSI Z223.1/NFPA 54–2009 or the authority having jurisdiction to determine whether relining is required. If relining is required, use a properly sized listed metal liner, Type–B vent, or a listed alternative venting design.

NOTE: See the ANSI Z223.1/NFPA 54–2009, 13.1.9 and 13.2.22 regarding alternative venting design and the exception, which cover installations such as the Chimney Adapter Kits NAHA001DH and NAHA002DH.

The Chimney Adapter Kits are listed alternative venting designs for these furnaces. See the kit instructions for complete details.

Canada (and U.S.A.)–This furnace is permitted to be vented into a clay tile–lined masonry chimney that is exposed to the outdoors below the roof line, provided:

1. Vent connector is Type–B double–wall, and
2. This furnace is common vented with at least 1 draft hood–equipped appliance, and
3. The combined appliance input rating is less than the maximum capacity given in Table A, and
4. The input rating of each space–heating appliance is greater than the minimum input rating given in Table B for Masonry Chimneys for the local 99% Winter Design Temperature. Chimneys having internal areas greater than 38 square inches (245 sq. cm) require furnace input ratings greater than the input ratings of these furnaces. See footnote at bottom of Table B, and
5. The authority having jurisdiction approves.

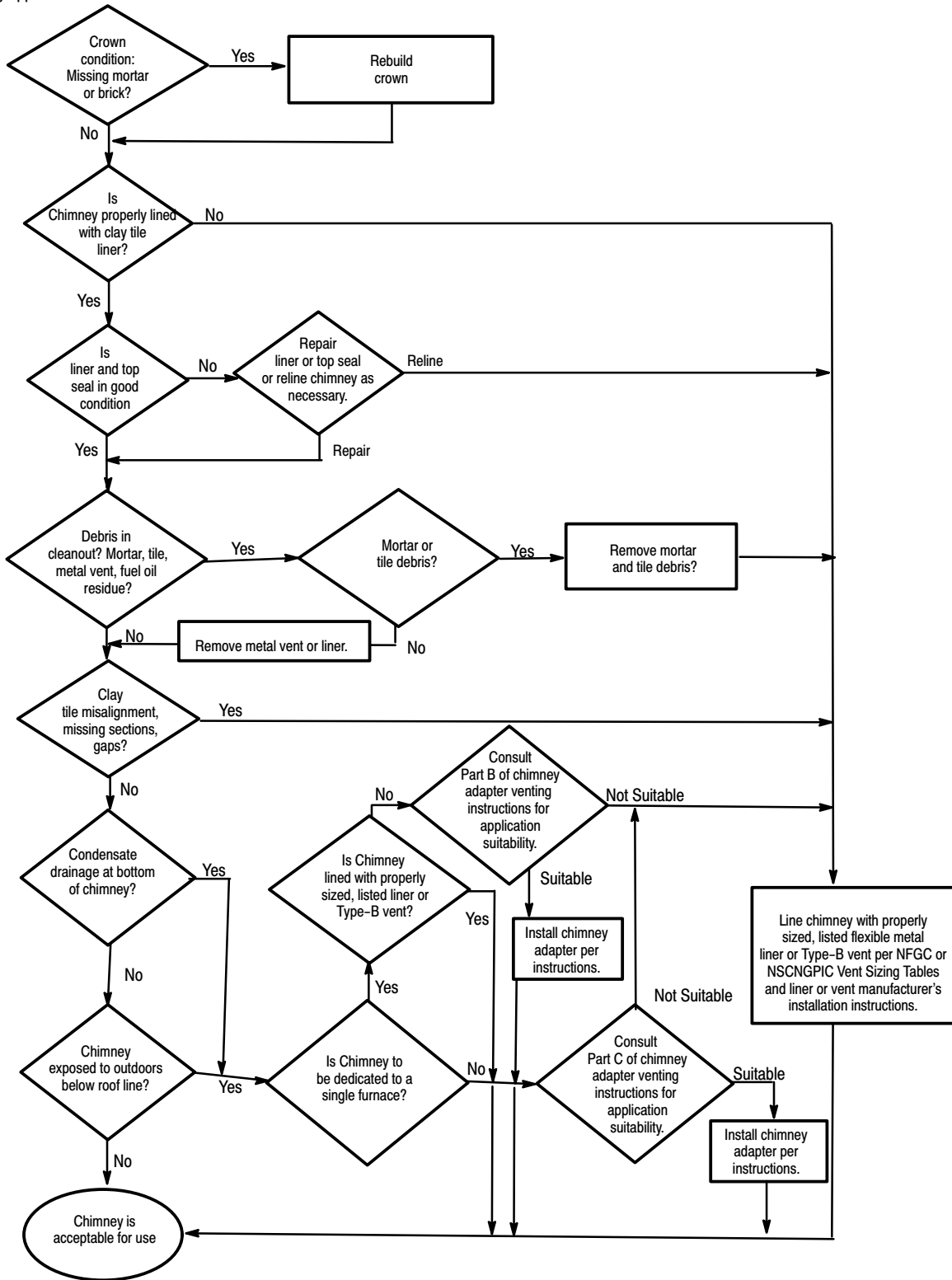
If all of these conditions cannot be met, an alternative venting design shall be used, such as the listed chimney adapter kit with a furnace listed for use with the kit, a listed chimney–lining system, or a Type–B vent.

These furnaces are CSA design–certified for use in exterior clay tile–lined masonry chimneys with a factory accessory Chimney Adapter Kit. Refer to the furnace rating plate for correct kit usage. The Chimney Adapter Kits are listed alternative venting designs and are for use with ONLY furnaces having a Chimney Adapter Kit number marked on the furnace rating plate.

Figure 11

CHIMNEY INSPECTION CHART

For additional requirements refer to the National Fuel Gas Code ANSI Z223.1/NFPA 54-2009 and ANSI/NFPA 211-2006 Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances in the U.S.A. or to the Canadian Installation Code CSA B149.1-05 in Canada.



Exterior Masonry Chimney, FAN+NAT Installations with Type-B Double-Wall Vent Connectors

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**Table A-
Combined Appliance
Maximum Input Rating in
Thousands of Btu per Hr**

VENT HEIGHT FT(m)	INTERNAL AREA OF CHIMNEY SQ IN.(mm)			
	12(77.4)	19(122.6)	28(180.6)	38(245.2)
6(1.8)	74	119	178	257
8(2.4)	80	130	193	279
10(3)	84	138	207	299
15(4.6)	NR	152	233	334
20(6.1)	NR	NR	250	368
30(9.1)	NR	NR	NR	404

**Table B-
Minimum Allowable Input Rating of
Space-Heating Appliance in
Thousands of Btu per Hr**

VENT HEIGHT FT(m)	INTERNAL AREA OF CHIMNEY sq. in.(mm)				
	12(77.4)	19(122.6)	28(180.6)	38(245.2)	
17 to 26°F (-8 to -3°C)	Local 99% Winter Design Temperature: 17 to 26°F (-8 to -3°C)*				
	6(1.8)	0	55	99	141
	8(2.4)	52	74	111	154
	10(3)	NR	90	125	169
	15(4.6)	NR	NR	167	212
	20(6.11)	NR	NR	212	258
5 to 16°F (-15 to -9°C)	Local 99% Winter Design Temperature: 5 to 16°F (-15 to -9°C)*				
	6(1.8)	NR	78	121	166
	8(2.4)	NR	94	135	182
	10(3)	NR	111	149	198
	15(4.6)	NR	NR	193	247
	20(6.11)	NR	NR	NR	293
-10 to 4°F (-23 to -16°C)	Local 99% Winter Design Temperature: -10 to 4°F (-23 to -16°C)*				
	6(1.8)	NR	NR	145	196
	8(2.4)	NR	NR	159	213
	10(3)	NR	NR	175	231
	15(4.6)	NR	NR	NR	283
	20(6.11)	NR	NR	NR	333
-11°F (-24°C) or lower	Local 99% Winter Design Temperature: -11°F (-24°C) or lower* Not recommended for any vent configuration				

* The 99% Winter Design Dry-Bulb (db) temperatures are found in the 2005 ASHRAE Fundamentals Handbook CD and Chapter 28.

Inspections before the sale and at the time of installation will determine the acceptability of the chimney or the need for repair and/or (re)lining. Refer to the Chimney Inspection Chart to perform a chimney inspection.

If the inspection of a previously used tile-lined chimney:

- a. Shows signs of vent gas condensation, the chimney should be relined in accordance with local codes and the authority having jurisdiction. The chimney should be relined with a listed metal liner, Type-B vent, or a listed chimney adapter kit to reduce condensation. If a condensate drain is required by local code, refer to the ANSI Z223.1/NFPA 54-2009, Section 12.10 for additional information on condensate drains.
- b. Indicates the chimney exceeds the maximum permissible size in the tables, the chimney should be rebuilt or relined to conform to the requirements of the equipment being installed and the authority having jurisdiction.

A chimney without a clay tile liner, which is otherwise in good condition, shall be rebuilt to conform to ANSI/NFPA 211-2006 or be lined with a UL listed (ULC listed in Canada) metal liner or UL listed Type-B vent. Relining with a listed metal liner or Type-B vent is considered to be a vent-in-a-chase.

If a metal liner or Type-B vent is used to line a chimney, no other appliance shall be vented into the annular space between the chimney and the metal liner.

APPLIANCE APPLICATION REQUIREMENTS

Appliance operation has a significant impact on the performance of the venting system. If the appliances are sized, installed, adjusted, and operated properly, the venting system and/or the appliances should not suffer from condensation and corrosion. The venting system and all appliances shall be installed in accordance with applicable listings, standards, and codes.

The furnace should be sized to provide 100 percent of the design heating load requirement plus any margin that occurs because of furnace model size capacity increments. Heating load estimates can be made using approved methods available from Air Conditioning Contractors of America (Manual J); American Society of Heating, Refrigerating, and Air-Conditioning Engineers; or other approved engineering methods. Excessive oversizing of the furnace could cause the furnace and/or vent to fail prematurely.

When a metal vent or metal liner is used, the vent or liner must be in good condition and be installed in accordance with the vent or liner manufacturer's instructions.

To prevent condensation in the furnace and vent system, the following precautions must be observed:

1. The return-air temperature must be at least 60°F(16°C) db except for brief periods of time during warm-up from setback at no lower than 55°F(13°C) db or during initial start-up from a standby condition.
2. Adjust the gas input rate per the installation instructions. Low gas input rate causes low vent gas temperatures, causing condensation and corrosion in the furnace and/or venting system. Derating is permitted only for altitudes above 2000' (610m).
3. Adjust the air temperature rise to the midpoint of the rise range or slightly above. Low air temperature rise can cause low vent gas temperature and potential for condensation problems.
4. Set the thermostat heat anticipator or cycle rate to reduce short cycling.

Air for combustion must not be contaminated by halogen compounds which include chlorides, fluorides, bromides, and iodides. These compounds are found in many common home products such as detergent, paint, glue, aerosol spray, bleach, cleaning solvent, salt, and air freshener, and can cause corrosion of furnaces and vents. Avoid using such products in the combustion-air supply. Furnace use during construction of the building could cause the furnace to be exposed to halogen compounds, causing premature failure of the furnace or venting system due to corrosion.

Vent dampers on any appliance connected to the common vent can cause condensation and corrosion in the venting system. Do not use vent dampers on appliances common vented with this furnace.

8. Gas Supply and Piping



WARNING

CARBON MONOXIDE POISONING, FIRE AND EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

Models designated for Natural Gas are to be used with Natural Gas ONLY, unless properly converted to use with Propane gas.

Gas Supply Requirements

- Use only the type of gas approved for this furnace. See rating plate for approved gas type.
- Gas input must not exceed the rated input shown on the rating plate. Overfiring will result in failure of heat exchanger and cause dangerous operation.
- Do not allow minimum supply pressure to vary downward. Doing so will decrease input to furnace. Refer to **Table 3** for gas supply. Refer to **Table 6** and **Table 7** for manifold pressures.

Table 3		Gas Pressures		
Gas Type	Supply Pressure			
	Recommended	Max.	Min.	
Natural	7 in wc (1744 Pa)	14 in wc (3487 Pa)	4.5 in wc (1121 Pa)	
Propane	11 in wc (2740 Pa)	14 in wc (3487 Pa)	11 in wc (2740 Pa)	

Gas Piping Requirements

NOTE: The gas supply line must be installed by a qualified service technician in accordance with all building codes.

NOTE: In the state of Massachusetts.

- Gas supply connections **MUST** be performed by a licensed plumber or gas fitter.
 - When flexible connectors are used, the maximum length shall not exceed 36" (914.4mm).
 - When lever handle type manual equipment shutoff valves are used, they shall be T-handle valves.
 - The use of copper tubing for gas piping is **NOT** approved.
- Install gas piping in accordance with local codes, or in the absence of local codes, the applicable national codes.
 - It is recommended that a manual equipment shutoff valve be installed in the gas supply line outside the furnace. Locate valve as close to the furnace as possible where it is readily accessible. Refer to **Figure 12**.



WARNING

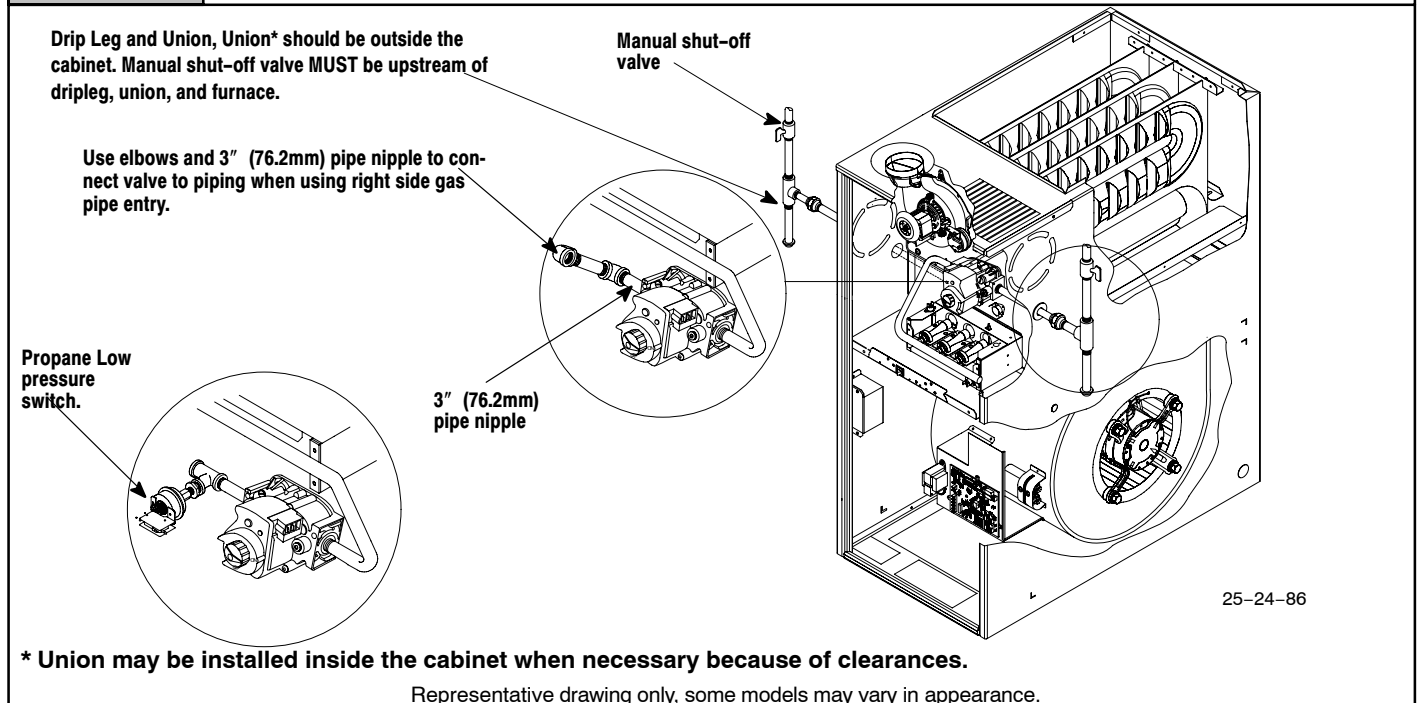
FIRE HAZARD

Failure to follow this warning could result in personal injury or death.

Use wrench to hold furnace gas valve when turning elbows and gas line to prevent damage to the gas valve and furnace.

Figure 12

Typical Gas Piping (N8MP)



- Use black iron or steel pipe and fittings or other pipe approved by local code.
- Use pipe thread compound which is resistant to natural and Propane gases.
- Use ground joint unions and install a drip leg no less than 3" (76.2mm) long to trap dirt and moisture before it can enter gas valve inside furnace.
- Provide a 1/8" NPT plugged tapping for test gauge connection immediately up stream of gas supply connection to furnace.
- Use two pipe wrenches when making connections to prevent furnace gas valve from turning.

NOTE: If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously served another gas appliance.

- Flexible corrugated metal gas connector may **NOT** be used inside the furnace or be secured or supported by the furnace or ductwork.
- Properly size gas pipe to handle combined appliance load or run gas pipe directly from gas meter or Propane gas regulator.
- Install correct pipe size for run length and furnace rating.
- Measure pipe length from gas meter or Propane second stage regulator to determine gas pipe size.

Right Side Gas Supply Piping (N8MP)

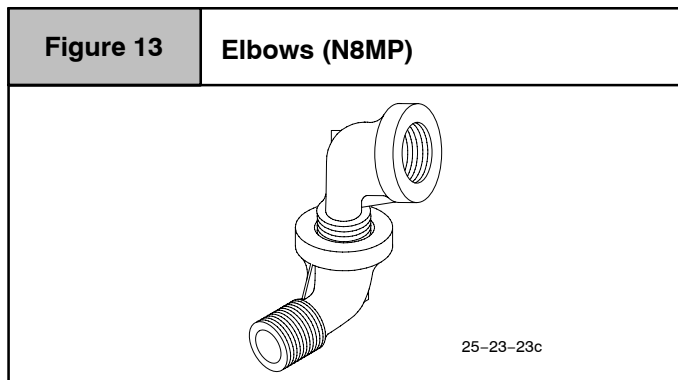
Gas line can be installed directly to the gas valve through the hole provided in the right side of the cabinet. See **Figure 12**

Left Side Gas Supply Piping (N8MP)

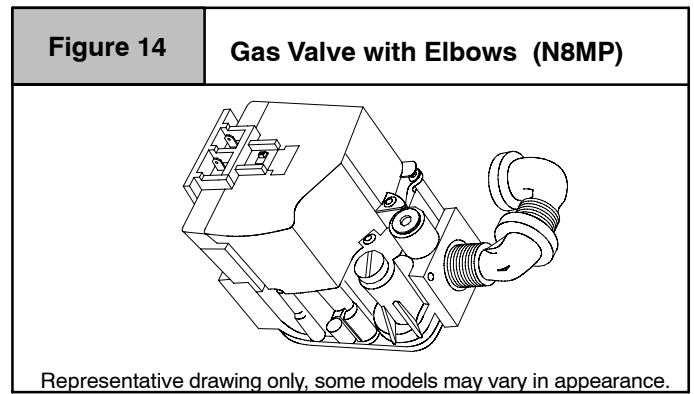
Two(2) 90° street elbows or two(2) 90° standard elbows and two(2) close nipples are required for left side gas supply. See **Figure 12**.

Piping with Street Elbows

- Assemble the elbows so that the outlet of one(1) elbow is 90° from the inlet of the other. The elbows should be tight enough to be leak proof. An additional 1/4 turn will be required at the end of step 2, see **Figure 13**.



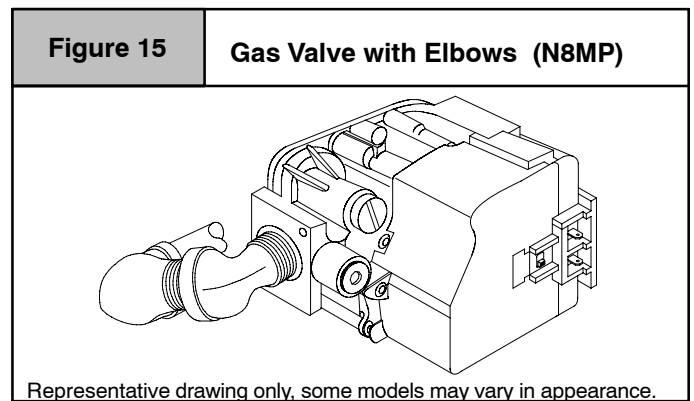
- Screw elbow assembly into gas valve far enough to be leak proof. Position elbow assembly so that the inlet of the elbow is at the top of the gas valve. An additional 3/8 turn will be required in step 3. Turn open end of inlet elbow to face the left side of the furnace (1/4 turn), see **Figure 14**.



- Turn assembly an additional 3/8 turn to position inlet near the bottom back corner of the gas valve in line with gas opening on left side of furnace, see **Figure 15**.
- Gas supply line then can be run directly into opening of elbow.

Piping with Close Nipples and Standard Elbows

- Assemble elbows and nipples similar to street elbows shown in **Figure 13**.
- Follow steps 2 through 4 **Piping with Street Elbows**.



⚠ WARNING	
FIRE HAZARD	
<p>Failure to follow this warning could result in personal injury, or death, and/or property damage.</p>	
<p>Use wrench to hold furnace gas valve when turning elbows and gas line to prevent damage to the gas valve and furnace.</p>	

Left Side Gas Entry (*8MP) (See Figure 16)

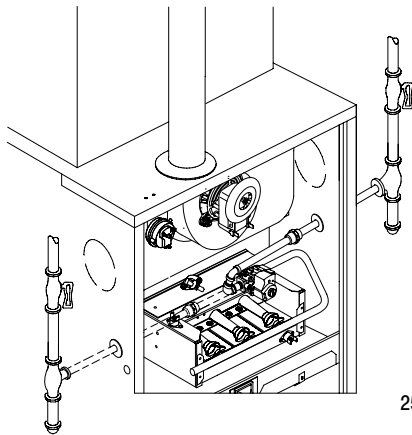
Pipe can be run directly to gas valve through the hole provided in the left side of the cabinet.

Right Side Gas Entry (*8MP) (See Figure 16)

Two (2) 90° street elbows or two (2) 90° standard elbows and two (2) close nipples are required for right side gas supply.

Figure 16

Typical Gas Piping (*8MP)



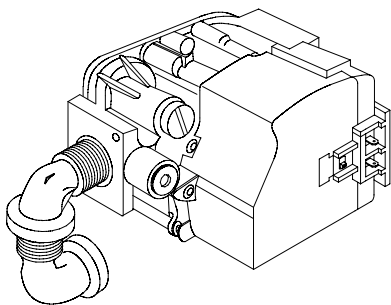
Representative drawing only, some models may vary in appearance.

Piping with Street Elbows

1. Screw one elbow onto gas valve with the outlet facing away from the furnace.
2. Screw second elbow onto first elbow tight enough to be leak proof. An additional $\frac{1}{4}$ turn will be required at the end of step 2. See **Figure 17** and **Figure 18**.

Figure 17

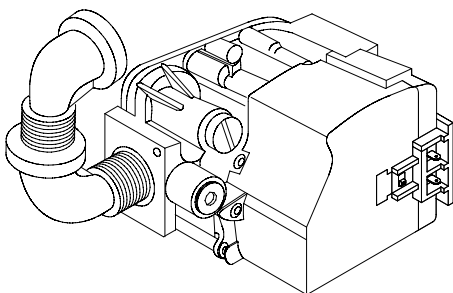
Gas Valve with Elbows (*8MP)



Representative drawing only, some models may vary in appearance.

Figure 18

Gas Valve with Elbows (*8MP)



Representative drawing only, some models may vary in appearance.

3. Gas supply line then can be run directly into opening of elbow.

Piping with Close Nipples and Standard Elbows

1. Assemble elbows and nipples similar to street elbows shown in **Figure 13**.
2. Follow steps 2 through 4 **Piping with Street Elbows**.



WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

A flexible corrugated metal gas connector must be properly installed, shall not extend through the side of the furnace, and shall not be used inside the furnace.

Black iron pipe shall be installed at the furnace gas valve and extend a minimum of 2" (50.8mm) outside furnace.

Additional Propane Piping Requirements

- Have a licensed Propane gas dealer make all connections at storage tank and check all connections from tank to furnace.
- If copper tubing is used, it **MUST** comply with limitation set in local codes, or in the absence of local codes, the gas codes of the country having jurisdiction.
- Two-stage regulation of Propane gas is recommended.



WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

An open flame or spark could result in death, personal injury and/or property damage.

Propane gas is heavier than air and will settle and remain in low areas and open depressions.

Thoroughly ventilate area and dissipate gas. Do NOT use a match or open flame to test for leaks, or attempt to start up furnace before thoroughly ventilating area.

Final Check

- Test all pipe for leaks.
- If orifices were changed, make sure they are checked for leaks.
- During pressure testing of gas supply piping system:
 - a. If test pressure does not exceed $\frac{1}{2}$ " psig, isolate the furnace from the gas supply piping system by closing the equipment shutoff valve.
 - b. If test pressure exceeds $\frac{1}{2}$ " psig, the furnace and its manual equipment shutoff valve must be disconnected from the gas supply piping system.
- Use a commercially available soap solution made specifically for the detection of leaks to check all connections..
- Do not use an open flame to test for gas leaks. Fire or explosion could occur.
- Correct even the smallest leak at once.

9. Electrical Wiring



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Turn OFF electrical power at fuse box or service panel, lockout, and tag switch with a suitable warning label before making any electrical connections and ensure a proper ground connection is made before connecting line voltage.

Power Supply Wiring

The furnace **MUST** be electrically wired and grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code (NEC), ANSI/NFPA 70-2008 in the U.S., or the Canadian Electrical Code (CEC), CSA C22.1 in Canada.

The power supply to the furnace connections must be between 104 VAC and 127 VAC during furnace operation for acceptable performance.

Field wiring connections must be made inside the furnace connection box. A suitable strain relief should be used at the point the wires exit the furnace casing.

Copper conductors shall be used. Line voltage wires should conform to temperature limitation of 35° C rise. Wire and circuit breaker sizing shall be based on the ampacity of the furnace electrical components plus the amps for all installed accessories (1.0 amps total for EAC and HUM). Ampacity can be determined by using the NEC or CEC.

NOTE: Furnace will not have normal operation if line polarity is reversed. Check ALL field and control connections prior to operation.

Furnace must be installed so the electrical components are protected from water and connected to its own separate circuit.

Junction Box (J-Box) Relocation

N8MPN/L Models

The J-box is installed in blower compartment on left side of casing. An alternate J-Box location on right side can be used.

1. Remove bag containing two hole plugs and two self-tapping screws from loose parts bag in blower compartment.
2. Remove and discard two screws holding J-Box to casing.
3. Move large hole plug from right to left J-Box location.
4. Move J-Box to alternate location and attach using two self-tapping screws from bag.
5. Apply two hole plugs from bag at left J-Box location.
6. Position all wires away from sharp edges and moving parts. Do not pinch J-Box wires or other wires when reinstalling blower compartment door.

*8MPN/L Models

The J-Box is installed in the burner compartment on left side of casing. An alternate J-Box location on right side can be used:

1. Remove and save two screws holding J-Box to casing.
2. Move large hole plug from right to left J-Box location.
3. Clip wire tie holding J-Box wires.
4. Move J-Box to alternate location and attach using two screws removed from left side location.
5. Position all wires away from hot surfaces, sharp edges, and moving parts. Do not pinch J-Box wires or other wires when reinstalling burner compartment door.

Thermostat

Thermostat location has an important effect on the operation of the furnace. Follow instructions included with thermostat for correct mounting and wiring.

Low voltage connections to furnace must be made on terminal board to furnace control. (See **Figure 19**)

If cooling is used, the **Y** from the thermostat must be connected to the control board **Y** to energize cooling blower speed.

When using a nonelectronic thermostat, the thermostat heat anticipator must be set to match the amp draw of the electrical components in R-W circuit. Accurate amp draw readings can be obtained at thermostat subbase terminals R and W. For an electronic thermostat, set cycle rate for 3 cycles per hour.

Measure heat anticipator current in series from R to W at the thermostat. If 24VAC humidifier is wired up to control, humidifier must be energized. Allow furnace to operate for two minutes before recording the AC amperage reading. Set anticipator on thermostat to recorded value.

Optional Equipment

All wiring from furnace to optional equipment **MUST** conform to local codes or, in the absence of local codes, the applicable national codes. Install wiring in accordance with manufacturer's instructions.

Humidifier/Electronic Air Cleaner

The furnace is wired for 115 VAC humidifier and/or electronic air cleaner connection.



CAUTION

REDUCED FURNACE LIFE HAZARD

Failure to follow this warning may result in reduced furnace life.

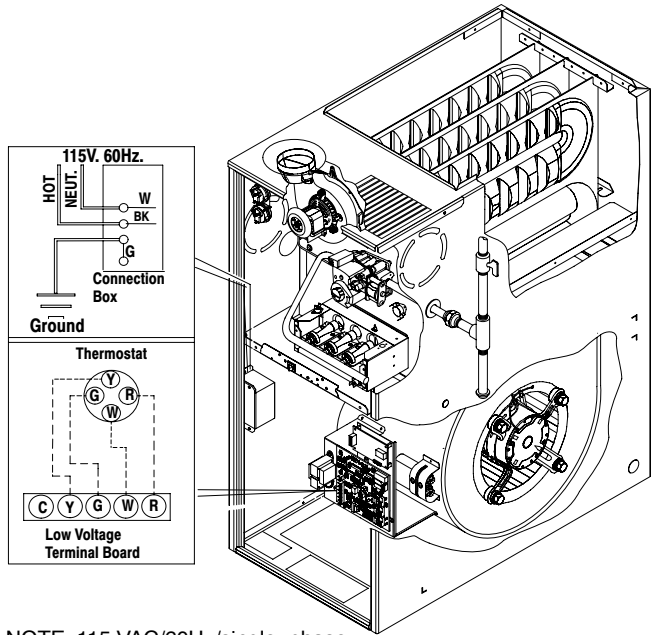
Do NOT exceed 115V/1.0 amp. maximum current load for both the EAC terminal and the HUM terminal combined.

HUMIDIFIER – The 24VAC HUM is energized when the pressure switch closes on a call for heat. The HUM (115VAC) is energized when the inducer is energized.

ELECTRONIC AIR CLEANER – EAC is energized when there is a blower speed call, except is NOT energized when blower operates in the hard-wired continuous fan mode.

Figure 19

Electrical Connections



NOTE: 115 VAC/60Hz/single-phase
Operating voltage range*: 127 VAC max, 104 VAC min.

* Permissible limits of voltage at which unit will operate satisfactorily
Drawing is representative some models may vary in appearance.

Furnace Control

The furnace control is preset at the factory with **ON** delay of 30 seconds in the heating mode. The blower **OFF** timing is preset at 140 seconds. If desired, the fan **OFF** delay can be reset to obtain the longest delay times while still maintaining comfort levels. See "Furnace Wiring Diagram".

10. Ductwork and Filter (Upflow/Horizontal)

⚠ WARNING
CARBON MONOXIDE POISONING HAZARD
Failure to follow this warning could result in personal injury or death.
Do NOT draw return air from inside a closet or utility room where furnace is located. Return air duct MUST be sealed to furnace casing.

Duct Connections

This furnace may be installed in only a bottom or side return-air duct application. Return air duct connections through the back of the furnace is **NOT** permitted.

Upflow ONLY: Side return-air duct connections can be made by cutting out the embossed area shown in **Figure 21**. A knockout hole is provided at each furnace side duct location to help start cutting the opening. Side duct connections are **NOT** permitted in horizontal flow applications.

Upflow and Horizontal Flow: Bottom return-air duct connections can be made by removing the knockout panel in the furnace base. Do **NOT** remove knock-out except for a bottom return-air duct connection.

Furnace Control Fuse

The 24V circuit contains a 5-amp, automotive-type fuse located on furnace control. (See **Figure 20**) Any electrical shorts of 24V wiring during installation, service, or maintenance may cause fuse to blow. If fuse replacement is required, use only a fuse of identical size (5 amp.).

Figure 20

Control Connections

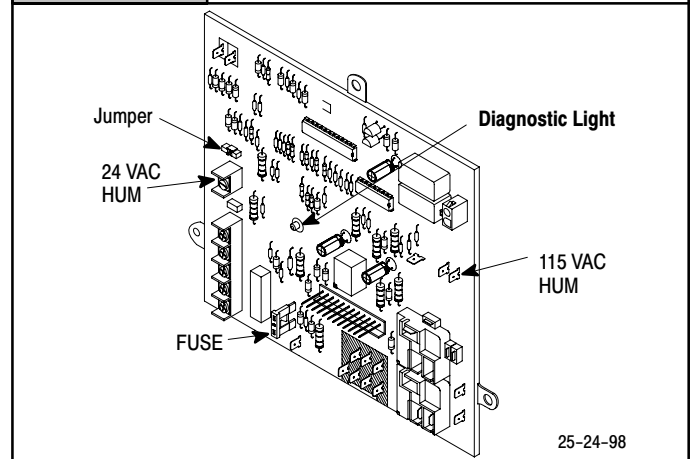
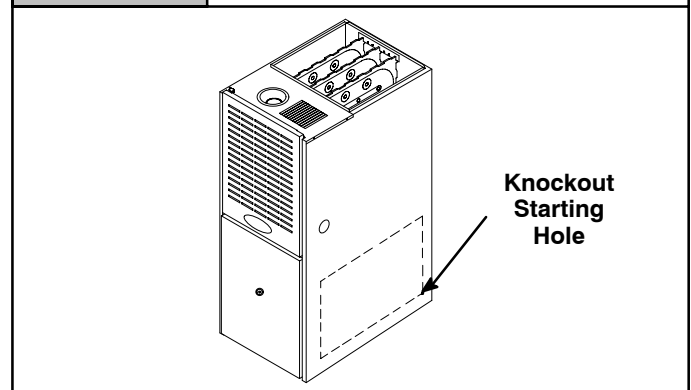


Figure 21

Cutting Side Return Air Opening



Duct Design

Design and install air distribution system to comply with Air Conditioning Contractors of America manuals or other approved methods that conform to local codes and good trade practices.

When the furnace is located in an area near or adjacent to the living area, the system should be carefully designed with returns to minimize noise transmission through the return air grille. Any blower moving a high volume of air will produce audible noise, which could be objectionable when the furnace is located very

close to a living area. It is often advisable to route the return air ducts under the floor or through the attic.

- Refer to furnace **Technical Support Manual** (Blower Data) for air flow information.
- Size ductwork to handle air flow for heating (and air conditioning if so equipped).

Duct Installation Requirements

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

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury, death, and/or component damage.

Install cooling coil on furnace discharge. Cool air passing over heat exchanger could cause condensate to form resulting in heat exchanger failure.

- When the furnace is used with a cooling unit, the furnace shall be installed parallel with or on the upstream side of the cooling unit to avoid condensation in the heating element.
- With a parallel flow arrangement, the dampers or other means used to control flow of air shall be adequate to prevent chilled air from entering the furnace. Chilled air going through the furnace could cause condensation and shorten furnace life. Dampers (purchased locally) can be either automatic or manual. Manually or automatically operated dampers **MUST** be equipped with a means to prevent furnace and air conditioning operation, unless damper is in the full heat or cool position.
- Installation of locking-type dampers is recommended in all branches, or in individual ducts to balance system's air flows.
- Non-combustible, flexible duct connectors are recommended for return and supply connections to furnace.
- If air return grille is located close to the fan inlet, install at least one 90° air turn between fan and inlet grille to reduce noise.
- Ductwork installed in attic or exposed to outside temperatures requires a minimum of 2" (50.8mm) of insulation with outdoor type vapor barrier.
- Ductwork installed in an indoor unconditioned space requires a minimum of 1" (25.4mm) of insulation with indoor type vapor barrier.

Inspection Panel on some models

For a furnace not equipped with a cooling coil, the outlet duct shall be provided with a removable access panel. This opening shall be accessible when the furnace is installed and shall be of such a size that the heat exchanger can be viewed for possible openings using light assistance or a probe can be inserted for sampling the air stream. This access cover shall be attached in such a manner as to prevent air leaks.

Filters

A filter **MUST** be used.

Filters are not supplied with these furnaces, but can be purchased from your distributor.

See **Table 4** for required high-velocity filter sizes.

Table 4	High-Velocity Air Filter Sizes (max. 600 FPM/3.0 m/s)			
	Cabinet Width in (mm)	Internal Filter in(mm)	External Filter Rack	
		Bottom	Bottom	Side+
15 ¹ / ₂ (393.7)	14 X 25 (355.6 x 635)	14 X 25 (355.6 x 635)	14 X 25 (355.6 x 635) or 16 X 25 (508 x 635)*	
19 ¹ / ₈ (485.8)	16 X 25 * (406.4 x 635) *	16 X 25 (406.4 x 635)*	16 X 25 (406.4 x 635)*	
22 ³ / ₄ (577.9)	20 X 25 (508 x 635)*	20 X 25 (508 x 635)*	16 X 25 (508 x 635)*	

* Greater than 1600 CFM with a maximum of 2000 CFM requires both (left and right) side return filter racks or for single return in an upflow application, must use filter rack NAHA001TK. See **Figure 22**.

+ Side return air duct(s) is not permitted with horizontal or downflow furnace installation.

Use either filter type:

- Washable, high-velocity filters are based on a maximum air flow rating of 600 FPM (3.0 m/s).
- Disposable, low velocity filters are based on a maximum air flow of 300 FPM (1.5 m/s) when used with external filter grille.

⚠ CAUTION

RISK OF REDUCED FURNACE LIFE

Failure to follow this Caution may result in premature furnace component failure.

Use of excessively dirty and/or restrictive air filters may increase furnace operating temperatures and shorten the life of the furnace.

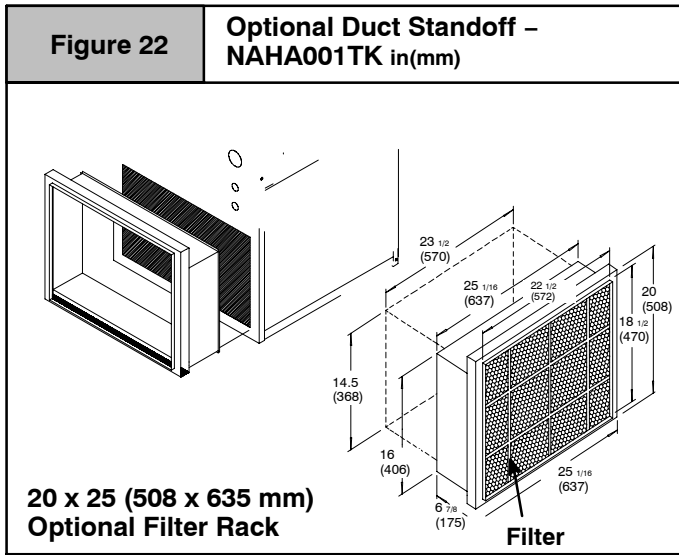
Filters specified for the furnace are rated at a maximum of 600 FPM air velocity and sized for the furnace's airflow rate. Replacement filters must be of equivalent type, size, and rating except as described below.

Disposable, low-velocity filters may be used to replace washable, high-velocity filters, providing they are sized for 300 FPM or less.

- The furnaces with 1600 (755 L/s) or less CFM rating use a 16" x 25" (406.4 x 635mm) high-velocity filter and rack. On these models the filter may be mounted internally for bottom return or a filter and rack may be mounted externally for bottom return.
- The furnaces with 1600 CFM to 2000 CFM (755 L/s to 944 L/s) may require that both (left and right) side returns are used or for single side return in upflow application, must use filter rack NAHA001TK. Filter racks must be mounted externally. See **Figure 24**.
- If return air must be on one side only, an optional 20" x 25" (508 x 635mm) filter standoff rack kit can be used. (See **Figure 22**.) For bottom return, an internal filter can be used or a filter rack kit can be mounted externally.
- See *Circulator Air Blower Data* for additional data.

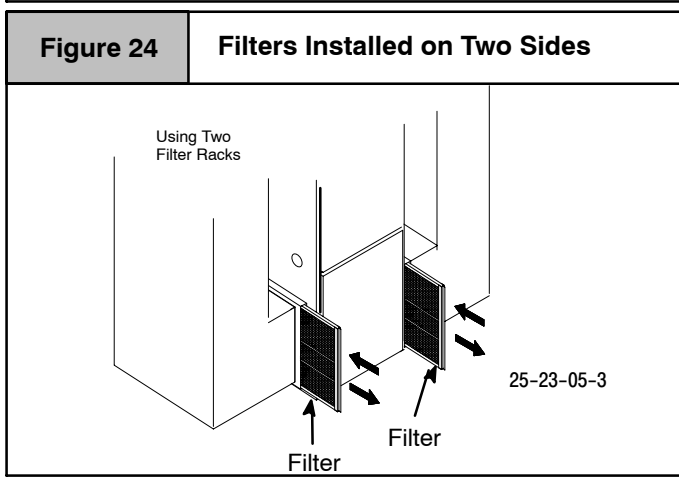
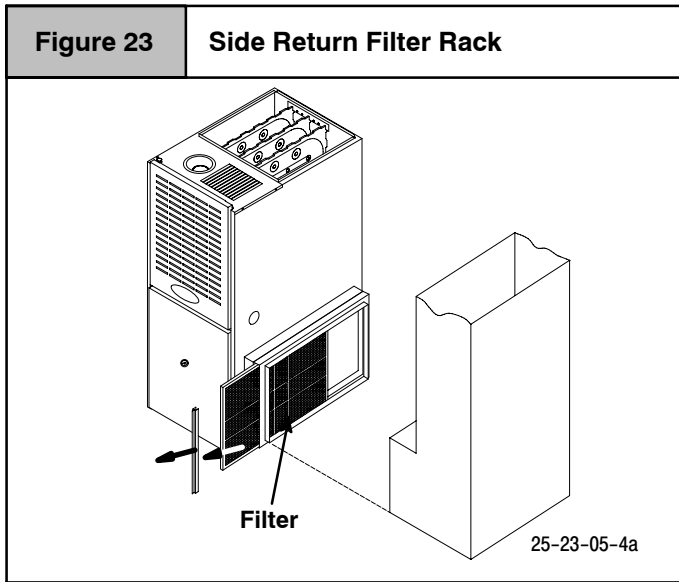
NOTE: The 20" x 25" (508 x 635mm) standoff side filter rack gives more filter area but does not provide more air. See **Figure 22**. To achieve 2000 CFM (944 L/s), two side returns may be required. See **Figure 24**.

NOTE: Disposable low-velocity filters may be replaced with washable, high-velocity filters. Washable, high-velocity filters can be replaced **ONLY** with same type and size filter unless low-velocity filters meet the minimum size areas for 300 FPM or less.



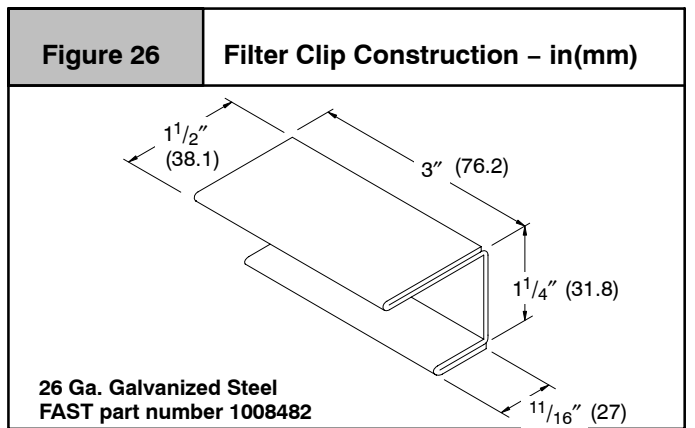
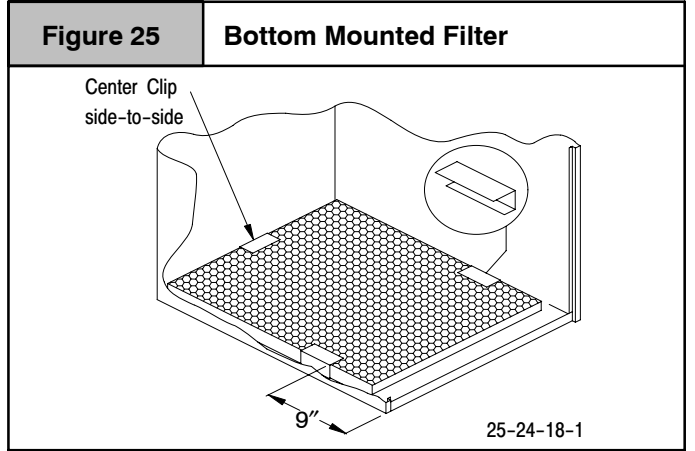
Optional Filter Rack Installation: Side Return

Center the filter rack on the side panel, flush with the bottom edge of the furnace. Mark the fastening holes. Drill the fastening holes in the side panel and fasten the filter rack in place with sheet metal screws. See **Figure 23** and **Figure 24**.



Internal Filter in Bottom-Return Installation

When installing a bottom-mounted filter inside the furnace, install the filter clips on the edge of the bottom duct opening with the wider end of the clips toward the blower, as shown in **Figure 25**. Clips may be obtained from your distributor or fabricated from sheet metal (**Figure 26**). Insert filter into side clips first and push filter back until it is fully engaged into back clip.



NOTE: If filters are only suitable for heating application, advise homeowner that filter size may need to be increased if air conditioning is added.

Addition Of Air Conditioning

When a refrigeration coil is used in conjunction with this furnace, it must be installed on the discharge side of the furnace to avoid condensation in the heat exchanger. All furnaces are designed with a break-away duct flange on the supply air side of the furnace. This allows for installation in the horizontal right or downflow applications. The coil installation instructions must be consulted for proper coil location and installation procedures. With a parallel flow arrangement, dampers must be installed to prevent chilled air from entering the furnace. If manually operated dampers are used, they must be equipped with a means to prevent operation of either unit unless the damper is in full heat or full cool position.

Copper or plastic tubing may be used for the condensate drain line.

11. Ductwork and Filter (Downflow)

⚠ WARNING
CARBON MONOXIDE POISONING HAZARD
 Failure to follow this warning could result in personal injury or death.
 Do NOT draw return air from inside a closet or utility room where furnace is located. Return air duct MUST be sealed to furnace casing.

⚠ WARNING
FIRE HAZARD
 Failure to follow this warning could result in bodily injury, death, and/or property damage.
 Side return air duct(s) may cause excessive furnace and/or air temperatures, which could result in death, bodily injury, and/or property damage.
 Return air duct is to be connected to only the top of downflow furnace.

⚠ WARNING
BURN HAZARD
 Failure to follow this warning could result in bodily injury, death, and/or property damage.
 The vent may be hot. Failure to install vent shield properly could result in personal injury.
 Install VENT PIPE SHIELD NAHA002VC as described below.

Vent Shield

Vent shield is required for all downflow installations. The vent **Must** exit out the side of the furnace for all downflow installations. This places the hot vent pipe (over 300° F/149° C) within reach of children. Vent shield attaches to side of furnace to cover vent pipe. See **Figure 5** in "Installation" section.

⚠ WARNING
FIRE HAZARD
 Failure to follow this warning could result in personal injury, death, and/or property damage.
 Place furnace on noncombustible subbase on downflow applications, unless installing on non-combustible flooring.

Outlet Duct Flange

Downflow installations with cased coils require the furnace outlet duct flange to be bent outward and flat to mate the outlet of the furnace to the cased coil.

Sub-Bases for Combustible Floors - Furnace Only

Note: When using the subbase for combustible floors, the discharge air duct flanges on the furnace **MUST** be broken down to provide proper fit up to the subbase. Use duct pliers to bend the duct flanges flat onto the furnace casing. **DO NOT** bend the duct flanges inward (toward the heat exchangers) as air flow restrictions may occur.

The Subbase for Combustible Floors **MUST** be used when a downflow furnace is set on a combustible floor, even when the furnace is installed on a coil box.

1. Cut the opening in the floor according to the dimensions in **Table 5** because the base is equipped with locating tabs that center the base over the opening.

The opening in the base is 1 1/4" (31.8mm) shorter and 1 1/8" (28.6mm) narrower than the minimum required size of the opening in the floor. This is done to maintain a 1" (25.4mm) clearance between the floor and the plenum.

2. Fabricate the plenum to the dimensions given in **Table 5**. Note that the dimensions given are outside dimensions.
3. Set the base over the opening in the floor, centering the opening in the base over the opening in the floor. Fasten the base to the floor with screws or nails. See **Figure 27**.
4. Drop the plenum through the opening in the base. The flange of the plenum should rest on top of the combustible floor base.

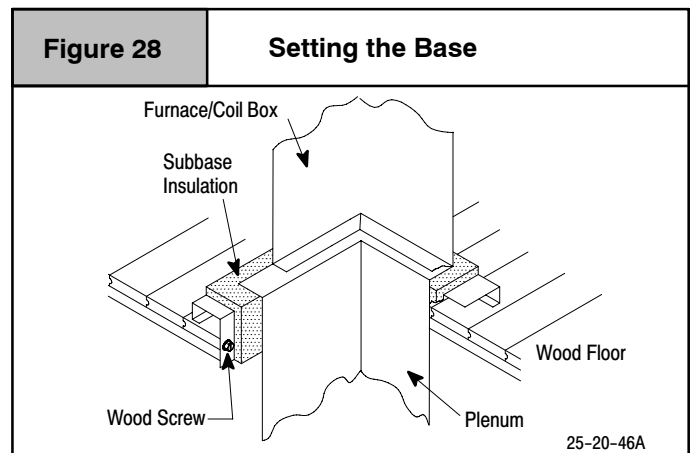
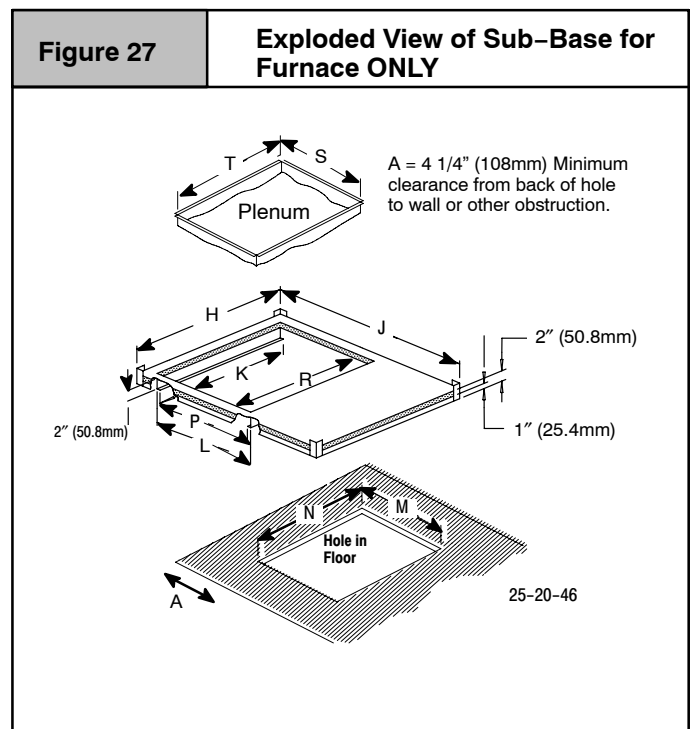
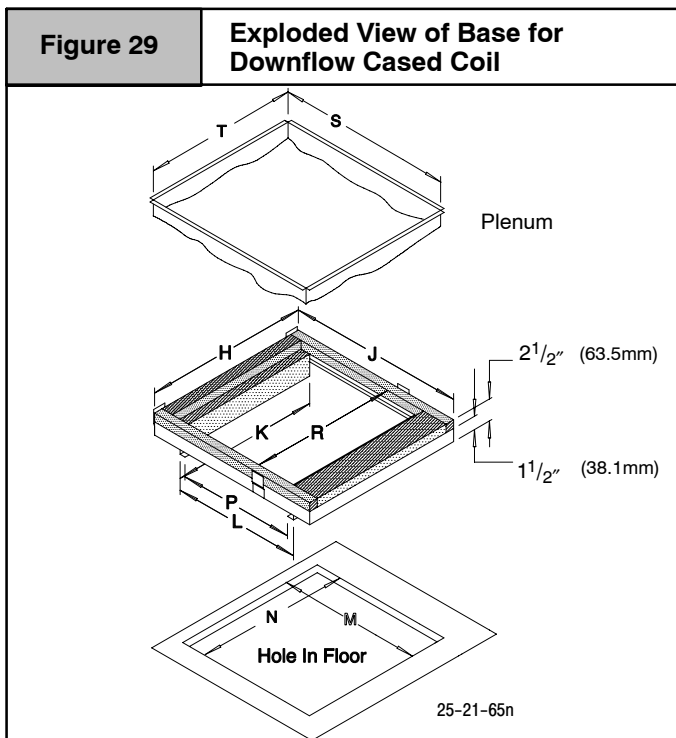


Table 5 Sub-bases for Combustible Floors Dimensions in(mm)										
Sub-base for Combustible Floors Part Number	Sub-base for Combustible Floor Dimensions				Opening In Floor		Opening In Base For Plenum		Typical Plenum Dimensions	
	H*	J*	K**	L	M	N	P	R	S	T
Subbase for Furnace Only										
NAHH001SB	15 ¹¹ / ₁₆ (398.5)	28 ³ / ₄ (730.3)	14 ⁹ / ₁₆ (369.9)	16(406.4)	16 ¹ / ₄ (412.8)	14 ⁵ / ₈ (371.5)	15 (381)	13 ¹ / ₂ (342.9)	15 (381)	13 ¹ / ₂ (342.9)
NAHH002SB	19 ⁹ / ₁₆ (490.5)	28 ³ / ₄ (730.3)	18 ³ / ₁₆ (462)	16(406.4)	16 ¹ / ₄ (412.8)	18 ¹ / ₄ (463.6)	15 (381)	17 ¹ / ₈ (435.6)	15 (381)	17 ¹ / ₈ (435.6)
NAHH003SB	22 ¹⁵ / ₁₆ (582.6)	28 ³ / ₄ (730.3)	21 ¹³ / ₁₆ (554)	16(406.4)	16 ¹ / ₄ (412.8)	21 ⁷ / ₈ (555.6)	15 (381)	19 ³ / ₄ (501.7)	15 (381)	19 ³ / ₄ (501.7)
Subbase for Coil Box										
NAHH004SB	15 ³ / ₄ (25.4)	20 ⁹ / ₁₆ (522.3)	14 ⁹ / ₁₆ (369.9)	16 ¹ / ₁₆ (408)	16 ¹ / ₄ (412.8)	14 ⁵ / ₈ (371.5)	15 (381)	13 ¹ / ₂ (342.9)	15 (381)	13 ¹ / ₂ (342.9)
NAHH005SB	19 ³ / ₈ (181.1)	20 ⁹ / ₁₆ (522.3)	18 ³ / ₁₆ (462)	16 ¹ / ₁₆ (408)	16 ¹ / ₄ (412.8)	18 ¹ / ₄ (463.6)	15 (381)	17 ¹ / ₈ (435.6)	15 (381)	17 ¹ / ₈ (435.6)
NAHH006SB	23 (284.2)	20 ⁹ / ₁₆ (522.3)	21 ¹³ / ₁₆ (554)	16 ¹ / ₁₆ (408)	16 ¹ / ₄ (412.8)	21 ⁷ / ₈ (555.6)	15 (381)	19 ³ / ₄ (501.7)	15 (381)	19 ³ / ₄ (501.7)

* Outside Dimension
** Base Spacer Side To Side
Conversion: 1 in = 25.4 mm



Sub-base for Combustible Floors - Downflow Coil Adapter Box

The subbase for combustible floors is required when a downflow furnace, **used with a downflow coil box**, is set on combustible flooring.

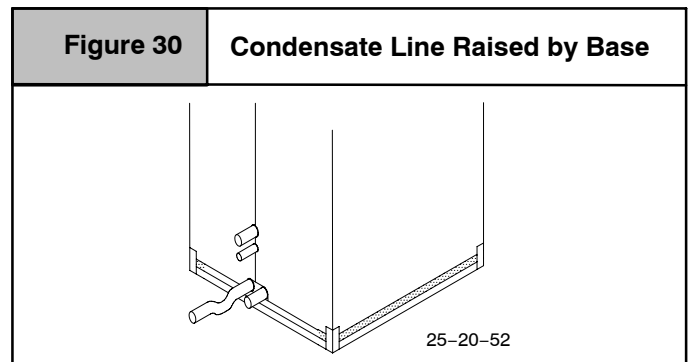
1. Cut the opening in the floor according to the dimensions in **Table 5** because the base is equipped with locating tabs that center the base over the opening.

The opening in the base is 1¹/₄" (31.8mm) shorter and 1¹/₈" (28.6mm) narrower than the minimum required size of the opening in the floor. This is done to maintain a 1" (25.4mm) clearance between the floor and the plenum.

2. Fabricate the plenum to the dimensions given in **Table 5**. Note that the dimensions given are outside dimensions.

3. Set the base over the opening in the floor, centering the opening in the base over the opening in the floor. Fasten the base to the floor with screws or nails. See **Figure 28**.
4. Drop the plenum through the opening in the base. The flange of the plenum should rest on top of the combustible floor base.

Consideration must be given to the height of the base to allow for easy installation of the condensate drain. See **Figure 30**. This subbase for combustible floors has been designed so that the height of the subbase raises the downflow coil off the floor to allow easy installation of the condensate drain



Non-Combustible Floor

Set the furnace over the opening in the floor. If necessary, grout around the base to seal air leaks between the base and the floor.

Duct Connections

In the downflow position, the return-air duct must be connected to only the top of the furnace. Top return connections can be made by removing the knockout panel in the furnace base. Return air connection through the side(s) or back of the furnace is **NOT** allowed.

Duct Design and Duct Installation Requirements

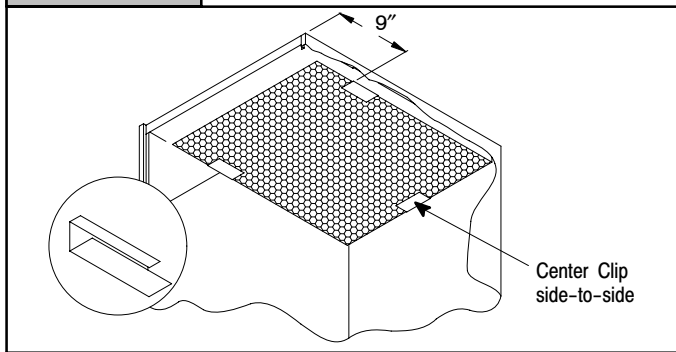
See **Section 10**.

Internal Filter in Top Return Installation

When installing top-mounted filter inside the furnace, install the filter clips on the edge of the top duct opening with the wider end of the clips toward the blower as shown in **Figure 31**. Clips may be obtained from your distributor or fabricated from sheet metal (**Figure 26**). Insert filter into side clips first and push filter back until it is fully engaged into back clip.

Figure 31

Top Mounted Internal Filter



NOTE: If filters are only suitable for heating application, advise homeowner that filter size may need to be increased if air conditioning is added.

Addition Of Air Conditioning

See Section 10.

12. Checks and Adjustments

Startup

NOTE: Refer to startup procedures in the *Users Information Manual*.



WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

If any sparks, odors or unusual noises occur, immediately shut OFF gas and power to furnace. Check for wiring errors or obstruction to blower.

Gas Supply Pressure

Gas supply pressure should be within minimum and maximum values listed on rating plate. Pressures are usually set by gas suppliers.

(See Propane Gas Conversion Kit instruction manual for furnaces converted to Propane gas.)

Manifold Gas Pressure Adjustment

NOTE: Make adjustment to manifold pressure with burners operating.



WARNING

FIRE OR EXPLOSION HAZARD

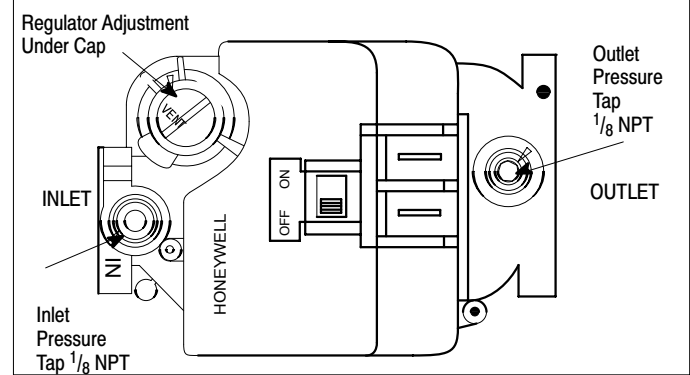
Failure to follow this warning could result in personal injury, death, and/or property damage.

Turn OFF gas at shut off before connecting manometer.

1. With gas OFF, connect manometer to manifold pressure tap on outlet of gas valve. See Figure 32. Use a manometer with a 0 to 12 in wc range.

Figure 32

Typical Gas Valve



2. Turn gas ON. Operate the furnace by using a jumper wire on the R to W thermostat connection on the control board.
3. Remove manifold pressure adjustment screw cap on furnace gas valve. Turn adjusting screw using 3/32 hex wrench, counterclockwise to decrease manifold pressure and clockwise to increase pressure.

NOTE: Adjustment screw cover **MUST** be replaced on gas valve before reading manifold pressure and operating furnace.

4. Set manifold pressure to value shown in Table 6 or Table 7.
5. When the manifold pressure is properly set, replace the adjustment screw cover on the gas valve.
6. Remove jumper wire from thermostat connection on control board. Remove manometer connection from manifold pressure tap, and replace plug in gas valve.
7. Check for leaks at plug.

Natural Gas Input Rating Check

The gas meter can be used to measure input to furnace. Check with gas supplier for actual BTU content.

1. Turn **OFF** gas supply to all appliances other than furnace and start furnace. Use jumper wire on R to W.
2. Time how many seconds it takes the smallest dial on the gas meter to make one complete revolution.

Note: If meter uses a 2 cubic foot dial, divide results (seconds) by two.

Refer to **Example**. The Example is based on a natural gas BTU content of 1,000 BTU's per cubic foot.

Example (BTUH)			
Natural Gas BTU Content per cubic foot	No. of Seconds Per Hour	Time Per Cubic Foot in Seconds	BTU Per Hour
1,000	3,600	48	75,000
$1,000 \times 3,600 \div 48 = 75,000$ BTUH			

To Determine the appliance kW input rate from a .05m³ test dial that has been clocked at 80 seconds for one complete revolution.

Example (kW)			
Number of seconds per hour	Number of seconds per complete rotation	Size of test dial (.05m ³)	kW m ³ /h
3,600	80	.05	2.25
$3,600 \div 80 \times .05 = 7.2$ m ³ /h			
$2.25 \text{ m}^3/\text{h} \times 10.35 \text{ kWh/m}^3 = 23.28$ kW			
$23.28 \times 3.412 = 79,431$ BTU			

3. Remove jumper wire from R to W.
4. Relight all appliances and ensure all pilots are operating.

Orifice Sizing

NOTE: Factory sized orifices for natural gas and Propane gas are listed in the furnace Technical Support Manual.

Ensure furnace is equipped with the correct main burner orifices. Refer to **Table 6** or **Table 7** for correct orifice size and manifold pressure for a given heating value and specific gravity for natural and propane gas.

Operation Above 2000' (610m) Altitude

⚠
WARNING

FIRE, EXPLOSION, CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

This high-altitude gas-conversion shall be done by a qualified service agency in accordance with the Manufacturer's instructions and all applicable codes and requirements, or in the absence of local codes, the applicable national codes.

These furnace may be used at full input rating when installed at altitudes up to 2000'. When installed above 2000' (610m), the input must be decreased 2% (natural) or 4% (Propane) for each 1000' (305m) above sea level in the USA. In Canada, the input rating must be derated 5% (natural) or 10% (Propane) for each 1000' above sea level. This may be accomplished by a simple adjustment of manifold pressure or an orifice change, or a combination of a pressure adjustment and an orifice change. The changes required depend on the installation altitude and the heating value of the fuel. **Table 6** & **Table 7** show the proper furnace manifold pressure and gas orifice size to achieve proper performance based on elevation above sea level for both natural gas and propane gas.

To use the natural gas table, first consult your local gas utility for the heating value of the gas supply. Select the heating value in the first column and follow across the table until the appropriate elevation for the installation is reached. The value in the box at the intersection of the altitude and heating value provides not only the manifold pressure but also the orifice size. In the natural gas tables the factory-shipped orifice size is in bold (42). Other sizes must be obtained from service parts.

High Altitude Input Rate = Nameplate Sea Level Input Rate x (Multiplier) [USA]		
Elevation ft (m)	High Altitude Multiplier	
	Natural Gas	Propane Gas
2001' - 3000' (610 - 914)	0.95	0.90
3001' - 4000' (915 - 1219)	0.93	0.86
4001' - 5000' (1220 - 1524)	0.91	0.82
5001' - 6000' (1524 - 1829)	0.89	0.78
6001' - 7000' (1829 - 2134)	0.87	0.74
7001' - 8000' (2134 - 2438)	0.85	0.70

* Based on mid-range of elevation.

MANIFOLD PRESSURE AND ORIFICE SIZE FOR HIGH ALTITUDE APPLICATIONS

Table 6		NATURAL GAS MANIFOLD PRESSURE (in wc)													
HEATING VALUE at ALTITUDE BTU/CU. FT.		MEAN ELEVATION ABOVE SEA LEVEL – ft(m)													
		0 to 2000 (0 to 610)		2001 to 3000* (610 to 914)*		3001 to 4000 (915 to 1219)		4001 to 5000 (1220 to 1524)		5001 to 6000 (1524 to 1829)		6001 to 7000 (1829 to 2134)		7001 to 8000 (2134 to 2438)	
		Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure
700	---	---	---	---	---	---	---	---	---	---	---	---	41	3.7	
725	---	---	---	---	---	---	---	---	---	---	---	41	3.7	41	3.4
750	---	---	---	---	---	---	---	---	---	---	---	41	3.5	42	3.6
775	---	---	---	---	---	---	---	---	---	41	3.6	42	3.6	42	3.3
800	---	---	---	---	---	---	41	3.6	42	3.7	42	3.4	42	3.1	
825	---	---	---	---	41	3.7	41	3.4	42	3.5	42	3.2	42	2.9	
850	---	---	---	---	41	3.5	42	3.6	42	3.3	42	3.0	42	2.8	
875	---	---	41	3.6	42	3.6	42	3.4	42	3.1	42	2.8	42	2.6	
900	---	---	42	3.7	42	3.4	42	3.2	42	2.9	42	2.7	42	2.5	
925	41	3.7	42	3.5	42	3.3	42	3.0	42	2.8	42	2.5	44	3.3	
950	41	3.5	42	3.3	42	3.1	42	2.9	42	2.6	42	2.4	44	3.1	
975	42	3.7	42	3.2	42	2.9	42	2.7	42	2.5	44	3.2	45	3.6	
1000	42	3.5	42	3.0	42	2.8	42	2.6	42	2.4	45	3.7	45	3.4	
1050	42	3.2	42	2.7	42	2.5	44	3.3	45	3.6	---	---	---	---	
1100	43	3.6	42	2.5	44	3.2	45	3.6	---	---	---	---	---	---	

Conversion: 1 in wc = .25 kPa

NOTE: Natural gas data is based on 0.60 specific gravity. For fuels with different specific gravity consult the National Fuel Gas Code ANSI Z223.1/NFPA 54–2009 or National Standard of Canada, Natural Gas And Propane Installation Code CSA B149.1–05.

* In the USA, derating of these furnaces at 2% (Natural Gas) and 4% (Propane Gas) has been tested and design-certified by CSA. In Canada, the input rating must be derated 5% (Natural Gas) and 10% (Propane Gas) for altitudes of 2,000 to 4,500 (610 to 1372m) above sea level. Use the 2001 to 3000 (610 to 914m) column in Table 6 and Table 7.

Table 7		PROPANE GAS MANIFOLD PRESSURE (in wc)													
HEATING VALUE at ALTITUDE BTU/CU. FT.		MEAN ELEVATION ABOVE SEA LEVEL – ft(m)													
		0 to 2000 (0 to 610)		2001 to 3000* (610 to 914)*		3001 to 4000 (915 to 1219)		4001 to 5000 (1220 to 1524)		5001 to 6000 (1524 to 1829)		6001 to 7000 (1829 to 2134)		7001 to 8000 (2134 to 2438)	
		Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure	Orifice No.	Manifold Pressure
2500	10.0	10.0	9.0	10.0	9.4	8.5	10.0								
Orifice Size	#54	#54	#54	#55	#55	#55	#55	#56							

Conversion: 1 in wc = .25 kPa

NOTE: Propane data is based on 1.53 specific gravity. For fuels with different specific gravity consult the National Fuel Gas Code ANSI Z223.1/NFPA 54–2009 or National Standard Of Canada, Natural Gas And Propane Installation Code CSA B149.1–05.

* In the USA, derating of these furnaces at 2% (Natural Gas) and 4% (Propane Gas) has been tested and design-certified by CSA. In Canada, the input rating must be derated 5% (Natural Gas) and 10% (Propane Gas) for altitudes of 2,000 to 4,500 (610 to 1372m) above sea level. Use the 2001 to 3000 (610 to 914m) column in Table 6 and Table 7.

The burner orifice part nos. are as follows:

Orifice #41	1096942	Orifice #42	1011351
Orifice #43	1011377	Orifice #44	1011352
Orifice #45	1011353	Orifice #54	1011376
Orifice #55	1011354	Orifice #56	1011355

High Altitude Air Pressure Switch

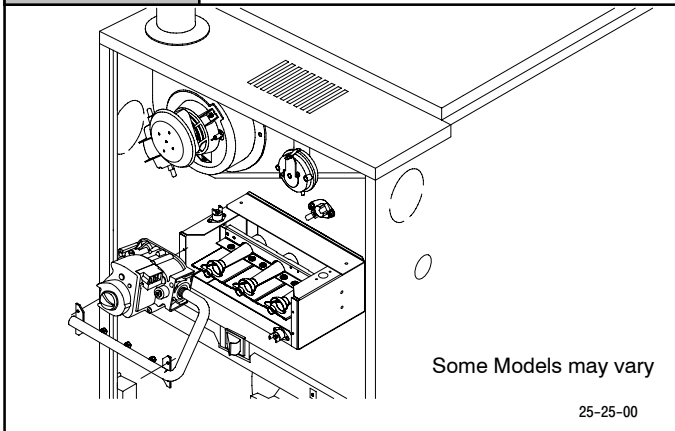
The factory-installed pressure switch need NOT be changed for any furnace installations from sea level up to and including 8,000' (2438m) altitude

Changing Orifices

1. After disconnecting power and gas supply to the furnace, remove the burner compartment door, exposing the burner compartment.
2. Disconnect gas line from gas valve so manifold can be removed.
3. Disconnect wiring at gas valve. Be sure to note the proper location of all electrical wiring before being disconnected.
4. Remove the four (4) screws holding the manifold and gas valve to the manifold supports. Do not discard any screws. See Figure 33.
5. Carefully remove the manifold assembly.
6. Remove the orifices from the manifold and replace them with proper sized orifices. See Figure 34.
7. Tighten orifices so they are seated and gas-tight. See Figure 34.
8. Reassemble all parts in reverse order as removed. Be sure to engage the main burner orifices in the proper openings in the burners.

Figure 33

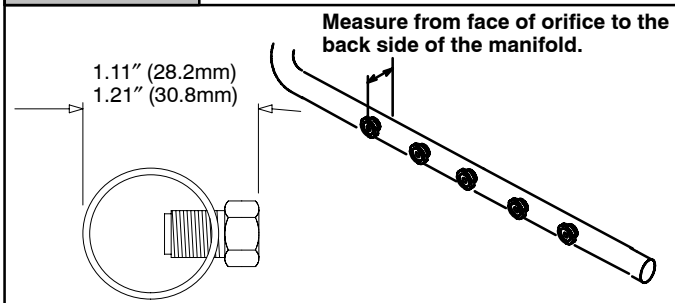
Manifold



9. After reassembling, turn gas on and check all joints for gas leaks using a soapy solution. All leaks must be repaired immediately.

Figure 34

Clearances



Propane Conversion

An accessory kit shall be used to convert to propane gas use, see the furnace rating plate for the Propane conversion accessory kit part number.



CAUTION

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning may result in personal injury, death, and/or property damage.

NOx inserts for use with Natural Gas units ONLY. If Propane Gas is required, NOx inserts must be removed.



WARNING

FIRE, EXPLOSION, UNIT DAMAGE HAZARD

Failure to follow this warning may result in personal injury, death, and/or property damage.

A Propane conversion accessory kit is required when operating the furnace with Propane gas.

*8MPLs and N8MPLs contain NOx inserts.

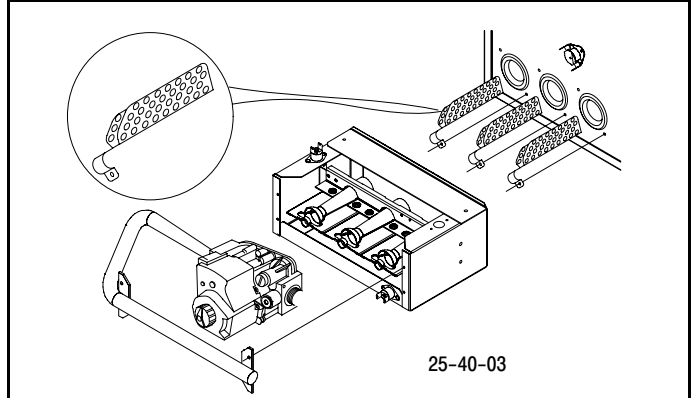
FOR PROPANE CONVERSION REMOVE SCREWS THAT SECURE THE NOx INSERT AND DISCARD INSERT.

Reinstall screws. See Figure 36

NOTE: It is very important to reinstall the NOx insert mounting screws.

Figure 35

Removing NOx inserts



Main Burner Flame Check

Allow the furnace to run approximately 10 minutes. Then inspect the main burner flames. See Figure 36.

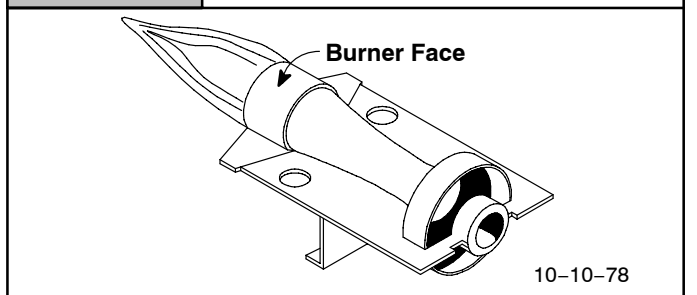
Check for the following:

- Stable and blue flames. Dust may cause orange tips or wisps of yellow, but flames **MUST NOT** have solid, yellow tips.
- Flames extending directly from burner into heat exchanger.
- Flames do **NOT** touch sides of heat exchanger

If any problems with main burner flames are noted, it may be necessary to adjust gas pressures or check for drafts.

Figure 36

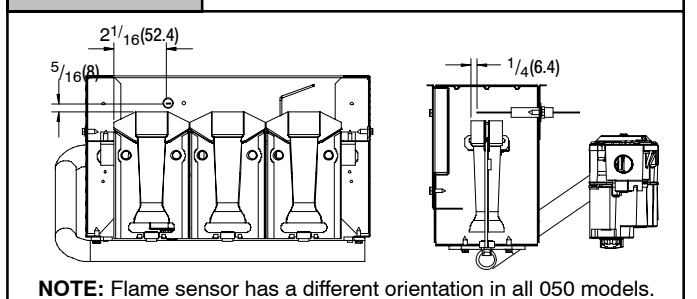
Main Burner



NOTE: For Ignitor location see Figure 37.

Figure 37

Ignitor Location in(mm)



Air Temperature Rise Check

⚠ CAUTION

REDUCED FURNACE LIFE HAZARD
Failure to follow this caution may result in reduced furnace life.

Use **ONLY** the blower motor speed taps insert indicated in the **Circulation Air Blower Data** for setting air temperature rise.

The blower speed **MUST** be set to give the correct air temperature rise through the furnace as marked on the rating plate. Temperature rise is the difference between supply and return air temperatures.

To check temperature rise, use the following procedure:

1. Place thermometers in supply and return air registers as close to furnace as possible, avoiding direct radiant heat from heat exchangers.
2. Operate furnace for 10 minutes with all the registers and duct dampers open by using a jumper wire on R to W thermostat connections on the control board.
3. Take readings and compare with range specified on rating plate.
4. If the air temperature rise is not in the correct range, the blower speed must be changed. A higher blower speed will lower the temperature rise. A lower blower speed will increase the temperature rise.
5. Remove the jumper wire after the adjustments are complete.

Changing Blower Speed

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Failure to follow this warning could result in personal injury, death and/or component damage.

Turn OFF power to furnace, lockout, and tag switch with a suitable warning label before changing speed taps.

NOTE: The speed taps that the manufacturer sets at the factory for this furnace are based on a nominal 400 CFM per ton cooling and the basic mid range on the temperature rise for heating.

Since the manufacturer cannot predict the static pressure that will be applied to the furnace, it is the responsibility of the installer dealer/contractor to select the proper speed tap leads for the application when the furnace is installed.

If it is necessary to change speeds, refer to steps below.

1. Refer to *Furnace Wiring Diagram* for location of the heating and cooling speed taps located on the electronic furnace control as well as location of unused blower motor speed leads. Use the chart (**Table 8**) to determine the blower motor speed settings.

Table 8 Blower Speed Chart	
<u>Wire Color</u>	<u>Motor Speed</u>
Black	High
Orange*	Med-High
Blue	Med-Low
Red	Low
* Med-High speed may not be provided on all models.	

2. Change the heat or cool blower motor speed by removing the motor speed lead from the **“Heat”** or **“Cool”** terminal and replace it with the desired motor speed lead from the **“M1”** or **“M2”** location. Connect the wire previously removed from the **“Heat”** or **“Cool”** terminal to the vacated **“M1”** or **“M2”** terminal.
3. If the same speed must be used for both heating and cooling, remove the undesired motor speed lead from the **“Heat”** or **“Cool”** terminal and connect that lead to the open terminal at **“M1”** or **“M2”** location or tape off. Attach a jumper between the **“Heat”** and **“Cool”** terminals and the remaining motor speed lead.

Note: When using the same speed on motors with (4) speed leads, it will be necessary to tape off the terminal of the motor speed lead removed from the **“Heat”** or **“Cool”** terminal with electrical tape since an open terminal will not be available at the **“M1”** or **“M2”** location.

Thoroughly check the system after modification to ensure the proper operation of the circulating air blower in all modes of operation.

Continuous-Fan Operation using “G”

Energizing the **“G”** terminal on the furnace control provides continuous fan operation. This is done by connecting the **G** terminal of the thermostat to the **G** terminal on the furnace control. When the **FAN** switch is turned from auto to ON the fan will operate continuously at **“HEAT”** speed. **EAC** will be energized in this mode.

NOTE: In heating, the fan will turn off during furnace ignition and warm up then restart at heating speed.

Hard Wired Continuous-Fan Operation

A terminal is provided on the furnace control board located in the circulating air blower compartment for operation of the continuous-fan option. This connection is intended for the low speed motor tap, and has a lower contact rating (8 amps) than the heat and cool taps. When the low speed blower lead is connected to this terminal, this will provide low speed blower operation whenever the other two speeds (**Heat** or **Cool**) are not energized. **EAC** is not powered in this mode.

Thoroughly check the system after modification to ensure the proper operation of the circulating air blower in all modes of operation.

Separate speed selections for Heat, Cool, and Continuous-Fan

Connect low speed lead from circulating air motor to the **“Cont”** terminal at the furnace control board. The appropriate motor leads should already be connected to the **“Heat”** and **“Cool”** terminals.

Heating and Continuous-Fan Speed the Same

If it is necessary to operate the heating speed and continuous-fan speed using the same blower speed, connect a jumper between the **“Heat”** and **“Cont”** terminals on the furnace control board.

Note: There should be only **ONE** motor lead going to the **“Heat”** and **“Cont”** terminals.

13. Furnace Maintenance



WARNING

FIRE, EXPLOSION, OR CARBON MONOXIDE POISONING HAZARDS

Failure to follow this warning could result in personal injury, death, and/or property damage.

It is recommended that the furnace be inspected and serviced on an annual basis (before the heating season) by a qualified service agency.

See "User's Information Manual".



WARNING

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD
Failure to follow this warning could result in dangerous operation, personal injury, death, or property damage.

Improper servicing could result in dangerous operation, injury, death or property damage.

- Before servicing, disconnect all electrical power to furnace, lockout, and tag switch with a suitable warning label.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
- Verify proper operation after servicing.

14. Sequence of Operation & Diagnostics

The following is the normal operating sequence.

Cooling (Y) Request:

24VAC signals applied to Y & G terminals of FCB (furnace control board)

- Cool motor speed is energized after 5 second Cool Fan On Delay time.

Y & G signals removed from FCB

- Cool motor speed is de-energized after 90 second Cool Fan Off Delay time.

Continuous Circulating Fan (G) Request:

24 VAC signal is applied to G terminal of the FCB.

- Heat motor speed is energized without delay.

G signal removed from FCB.

- Heat motor speed is de-energized after 5 second delay.

NOTE 1) Furnace de-energizes the fan during the heat exchanger warm-up period on a call for Heating that occurs during a G request unless a blower motor lead is connected to the Cont terminal on the FCB, in which case see NOTE 2).

NOTE 2) Heating or Cooling requests received during a Fan request cause the fan speed to change to the appropriate heat or cool speed after the Fan on Delay time expires. The fan returns to continuous circulating speed after the selected Fan Off Delay time expires following loss of the Heating or Cooling request.

Continuous Circulating Fan Hard-Wired (Cont) Request:

Field selected low speed motor tap installed on "CONT" terminal.

- Low speed is energized when power applied to furnace. Operates at this speed continuously while there are no other blower demands from furnace control. Fan demands from furnace control for heat, cool or "G" will override hard-wired speed tap.

NOTE 3) EAC is NOT active for hard-wired mode but IS active for fan demands from furnace control for heat, cool and "G".

Heating (W) Request:

Heating (W) Request:

- 24 VAC signal applied to W terminal of FCB.
- Inducer motor turns on and the pressure switch(es) close(s).
- Following a 15 second prepurge delay after the pressure switches closes, the igniter begins a 17 second warm-up.
- The gas valve is energized, the main burners light and flame is sensed.
- The igniter is de-energized after the main burners ignite.
- FCB will delay blower operation for the 30 seconds timed from the opening of the gas valve.

W signal removed from FCB.

- The gas valve de-energizes and the main burners go out.
- The inducer runs for a 15 second postpurge period.
- The fan stays at Heat speed.
- The fan de-energizes after the selected Heat Fan Off Delay time expires, timed from the gas valve de-energizing.

HUMIDIFIER – The 24V HUM is energized when the pressure switch closes on a call for heat. The 115V HUM (called HUM on Control) is energized when the inducer is energized.

ELECTRONIC AIR CLEANER – EAC is energized when there is a blower speed call. It is NOT energized when blower operates in the hard-wired continuous fan mode.

NOTE 4) If a new Heating request arrives while the control is waiting in the Heat Fan Off Delay time, the FCB will wait for the selected Heat Fan Off Delay then start a new heating cycle as long as the heat call remains.

Heating Request with Gas Shut Off:

24 VAC signal applied to W terminal of FCB.

The FCB will attempt 4 cycles of ignition then go to soft lockout for 3 hours then try for ignition again as long as the heat call remains. Power reset will clear lockout.

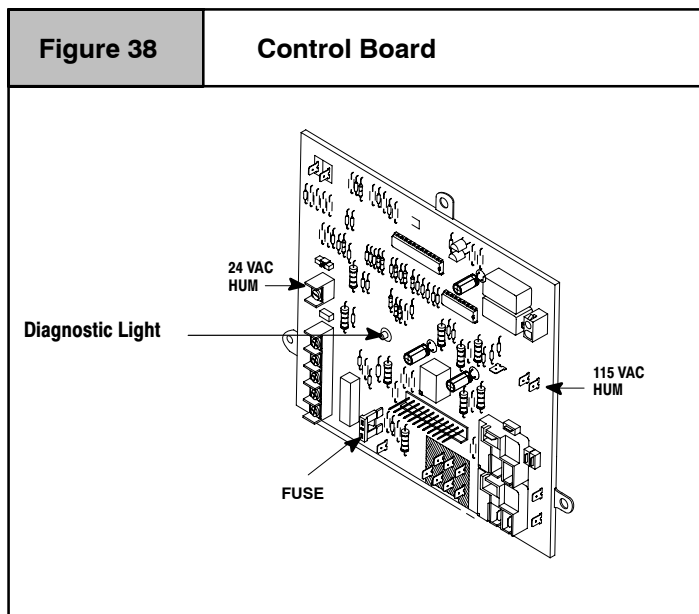
- Inducer motor turns on
- Following a 15 second prepurge delay, the igniter begins warm up.
- The igniter glows red-hot for 22 seconds, then turns off. The FCB flashes error code 6.
- The igniter stays off for 17 seconds, then begins to warm up again.
- The igniter glows red hot for 22 seconds then turns off. The FCB continues flashing error code 6.
- The igniter stays off for 17 seconds, then begins to warm up again.
- The igniter glows red hot for 22 seconds then turns off. The FCB continues flashing error code 6.
- The igniter stays off for 17 seconds, then begins to warm up again.
- The igniter glows red hot for 22 seconds then turns off. The FCB proceeds to soft lockout and stops flashing error code 6 and begins flashing error code 6 + 1.
- The inducer motor de-energizes after a 15 second post purge.

Control Board Diagnostic Codes (See Figure 38)

OFF	= 24VAC or 115VAC is off, fuse is open
Heartbeat	= Normal operation or no previous Diagnostic Code
ON SOLID	= Soft Lockout – Furnace Control Error (1 hr delay) If code repeats immediately following power reset then replace control
1 Flash	= Not used
2 Flashes	= Pressure switch(es) closed when should be open
3 Flashes	= Pressure switch open when should be closed
4 Flashes	= Limit or roll-out switch open (less than 2 minutes)
5 Flashes	= Flame sensed out of sequence
6 Flashes	= Failure to ignite or flame sense lost while running
6 + 1 Flashes	= Soft Lockout – Max trials for ignition reached (3hr delay)
7 Flashes	= Soft Lockout – Limit or roll-out switch open longer than 2 minutes (1 hr delay) (roll-out switch requires manual reset)
8 Flashes	= Permanent Lockout – Gas valve relay contact stuck closed or miswired gas valve (power reset only)
10 Flashes	= Line voltage (115VAC) polarity reversed. If twinned, refer to twinning kit instructions

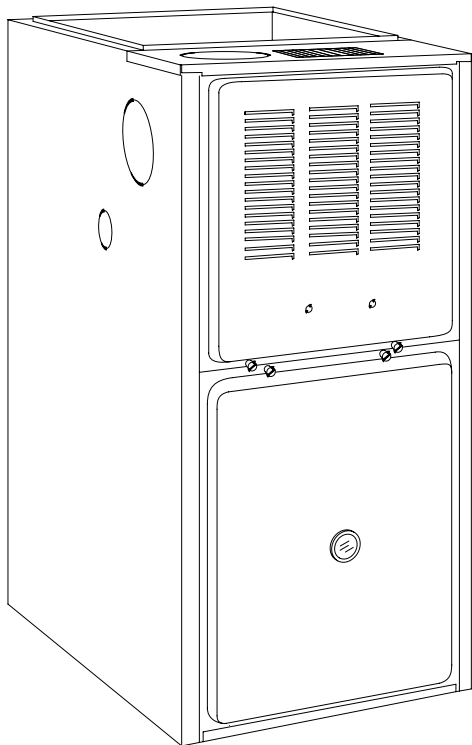
* If status code recall is needed, briefly (2–3 seconds) remove then reconnect one limit switch wire (main or rollout) to display last stored status code. Do not remove power or blower door before initiating status code recall or code will be lost. Code is automatically cleared after 72 hours or upon power reset.

* Proper flame sense microamps: 0.7 microamps D.C. minimum, 2.0 – 4.0 microamps nominal



Technical Support Manual

Save This Manual For Future Reference



Models

N8MPN050B12B2
N8MPN075B12B2
N8MPN075F16B2
N8MPN100F14B2
N8MPN100F20B2
N8MPN100J22B2
N8MPN125J20B2
N8MPN125J22B2

N8MPL050B12B2
N8MPL075B12B2
N8MPL075F16B2
N8MPL100F20B2
N8MPL100J22B2
N8MPL125J20B2
N8MPL125J22B2

*8MPN050B12B2
*8MPN075B12B2
*8MPN075F16B2
*8MPN100F14B2
*8MPN100F20B2
*8MPN100J20B2
*8MPN125J20B2
*8MPN150J20B2

*8MPL050B12B2
*8MPL075B12B2
*8MPL075F16B2
*8MPL100F20B2
*8MPL100J20B2
*8MPL125J20B2

* Denotes Brand

International Comfort Products, LLC
Lewisburg, TN 37091 U.S.A.



FAN ASSISTED COMBUSTION GAS FURNACES

Manufacturers Number (Mfr No -See Rating Plate)
ALL Models (N8MPN)

Specifications

	N8MPN 050B12		N8MPN 075B12		N8MPN 075F16		N8MPN 100F14		N8MPN 100F20		N8MPN 100J22		N8MPN 125J20		N8MPN 125J22	
General																
Input (Btuh)	50,000		75,000		75,000		100,000		100,000		100,000		125,000		125,000	
Output (Btuh)	40,000		60,000		60,000		80,000		80,000		80,000		100,000		100,000	
Temp. Rise (°F/°C)	35-65/19-36		35-65/19-36		25-55/14-30		30-60/17-33		35-65/19-36		30-60/17-33		30-60/17-33		30-60/17-33	
Electrical (Volts/Hz)	115/60		115/60		115/60		115/60		115/60		115/60		115/60		115/60	
Rating Plate Amps.	9.7		9.2		9.7		8.9		11.7		13.2		11.7		13.2	
Gas Type	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane
Transformer Size (VA)	40															
T'stat Heat Anticipator	.50															
Gas & Ignition																
Std. Main Orifices (No/Size)	2/#42	2/#54	3/#42	3/#54	3/#42	3/#54	4/#42	4/#54	4/#42	4/#54	4/#42	4/#54	5/#42	5/#54	5/#42	5/#54
Gas Valve Honeywell Regulation Type	VR8205S SNAP															
Manifold Press (in wc/Pa)	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490
Ignition Type/Series	Hot Surface															
Combustion																
Flue Outlet Size (Inches)	4		4		4		4		4		4		4		4	
Limits & Controls																
Thermal Sensor (°F/°C)	300/149		300/149		300/149		300/149		300/149		300/149		300/149		300/149	
Limit Control	See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List	
Std. Pressure Sw. (Part No)	1013529															
Press -Close (in wc/Pa)	-0.69/-172															
Press -Open (in wc/Pa)	-0.59/-147															
Furnace Control (Type)	Integrated															
Furnace Control On delay (Timed-secs)	30															
Furnace Control Off delay	60,100,140,180															
Blower Data																
Size Inches (D x W)	11-8		11-8		11-10		11-10		11-10		11-10		11-10		11-10	
Motor Type/H.P.	PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ³ / ₄		PSC ¹ / ₂		PSC ³ / ₄	
Cap. Mfd/Volts	10/370		7.5/370		10/370		7.5/370		10/370		40/370		10/370		40/370	
Filter Type (600 FPM)	Washable		Washable		Washable		Washable		Washable		Washable		Washable		Washable	
Filter Size inches	14x25x1		14x25x1		16x25x1		16x25x1		16x25x1(2)		20x25x1		20x25x1		20x25x1	
(Not Supplied) mm	355x635x25		355x635x25		406x635x25		406x635x25		406x635x25(2)		508x635x25		508x635x25		508x635x25	
1600 CFM and over inch(qty)	--		--		16x25x1(2)		--		16x25x1(2)		16x25x1		16x25x1		16x25x1	
mm(qty)	--		--		406x635x25(2)		--		406x635x25(2)		406x635x25(2)		406x635x25(2)		406x635x25(2)	
Min. Cool Cap. (Tons)	1.5		1.5		3		2		3		3		3		3	
Max. Cool Cap. (Tons)	3		3		4		3.5		5		5.5		5		5.5	
Gas Conversion Kits																
Nat to Propane	NAHA001LP (1172958*)															
Propane to Nat	NAHA001NG (1172960*)															
* Must be ordered from Service Parts																

Manufacturers Number (Mfr No -See Rating Plate)
ALL Models (N8MPL)

Specifications

	N8MPL 050B12		N8MPL 075B12		N8MPL 075F16		N8MPL 100F20		N8MPL 100J22		N8MPL 125J20		N8MPL 125J22	
General														
Input (Btuh)	50,000		75,000		75,000		100,000		100,000		125,000		125,000	
Output (Btuh)	40,000		60,000		60,000		80,000		80,000		100,000		100,000	
Temp. Rise (°F/°C)	35-65/19-36		35-65/19-36		25-55/14-30		35-65/19-36		30-60/17-33		30-60/17-33		30-60/17-33	
Electrical (Volts/Hz)	115/60		115/60		115/60		115/60		115/60		115/60		115/60	
Rating Plate Amps.	9.7		9.2		9.7		11.7		13.2		11.7		13.2	
Gas Type	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane
Transformer Size (VA)	40													
T'stat Heat Anticipator	.50													
Gas & Ignition														
Std. Main Orifices (No/Size)	2/#42	2/#54	3/#42	3/#54	3/#42	3/#54	4/#42	4/#54	4/#42	4/#54	5/#42	5/#54	5/#42	5/#54
Gas Valve Honeywell Regulation Type	VR 8205S SNAP													
Manifold Press. (in wc/Pa)	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490
Ignition Type/Series	Hot Surface													
Combustion														
Flue Outlet Size (Inches)	4		4		4		4		4		4		4	
Limits & Controls														
Thermal Sensor (°F/°C)	300/149		300/149		300/149		300/149		300/149		300/149		300/149	
Limit Control	See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List	
Std. Pressure Sw. (Part No)	1013529													
Press -Close (in wc/Pa)	-0.69/-172													
Press -Open (in wc/Pa)	-0.59/-147													
Furnace Control (Type)	Integrated													
Furnace Control On delay (Timed-secs)	30													
Furnace Control Off delay	60,100,140,180													
Blower Data														
Size Inches (D x W)	11-8		11-8		11-10		11-10		11-10		11-10		11-10	
Motor Type/H.P.	PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ³ / ₄		PSC ¹ / ₂		PSC ³ / ₄	
Cap. Mfd/Volts	10/370		7.5/370		10/370		10/370		40/370		10/370		40/370	
Filter Type (600 FPM)	Washable		Washable		Washable		Washable		Washable		Washable		Washable	
Filter Size inches	14x25x1		14x25x1		16x25x1		16x25x1		20x25x1		20x25x1		20x25x1	
(Not Supplied) mm	355x635x25		355x635x25		406x635x25		406x635x25		508x635x25		508x635x25		508x635x25	
1600 CFM and over inch(qty)	--		--		16x25x1(2)		16x25x1(2)		16x25x1(2)		16x25x1(2)		16x25x1(2)	
mm(qty)	--		--		406x635x25(2)		406x635x25(2)		406x635x25(2)		406x635x25(2)		406x635x25(2)	
Min. Cool Cap. (Tons)	1.5		1.5		3		3		3		3		3	
Max. Cool Cap. (Tons)	3		3		4		5		5.5		5		5.5	
Gas Conversion Kits														
Nat to Propane	NAHA001LP (1172958*)													
Propane to Nat	NAHA001NG (1172960*)													
* Must be ordered from Service Parts														

Manufacturers Number (Mfr No -See Rating Plate)
ALL Models (*8MPN)

Specifications

	*8MPN 050B12		*8MPN 075B12		*8MPN 075F16		*8MPN 100F14		*8MPN 100F20		*8MPN 100J20		*8MPN 125J20		*8MPN 150J20	
General																
Input (Btuh)	50,000		75,000		75,000		100,000		100,000		100,000		125,000		150,000	
Output (Btuh)	40,000		60,000		60,000		81,000		81,000		81,000		101,000		121,000	
Temp. Rise (°F/°C)	35-65/19-36		30-60/17-33		30-60/17-33		35-65/19-36		35-65/19-36		35-65/19-36		35-65/19-36		35-65/19-36	
Electrical (Volts/Hz)	115/60		115/60		115/60		115/60		115/60		115/60		115/60		115/60	
Rating Plate Amps.	9.7		9.0		9.7		9.2		12.0		12.0		12.0		13.5	
Gas Type	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane
Transformer Size (VA)	40															
T'stat Heat Anticipator	.50															
Gas & Ignition																
Std. Main Orifices (No/Size)	2/#42	2/#54	3/#42	3/#54	3/#42	3/#54	4/#42	4/#54	4/#42	4/#54	4/#42	4/#54	5/#42	5/#54	6/#42	6/#54
Gas Valve Honeywell Regulation Type	VR 8205S SNAP															
Manifold Press. (in wc/Pa)	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490
Ignition Type/Series	Hot Surface															
Combustion																
Flue Outlet Size (Inches)	4		4		4		4		4		4		4		4	
Limits & Controls																
Thermal Sensor (°F/°C)	300/149		300/149		300/149		300/149		300/149		300/149		300/149		300/149	
Limit Control	See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List	
Auxiliary Limit (°F/°C)	130/54		130/54		130/54		130/54		130/54		130/54		130/54		130/54	
Std. Pressure Sw. (Part No)	1013529															
Press -Close (in wc/Pa)	-0.69/-172															
Press -Open (in wc/Pa)	-0.59/-147															
Furnace Control (Type)	Integrated															
Furnace Control On (Timed-secs) Off	30 60,100,140,180															
Blower Data																
Size Inches (D x W)	11-8		11-8		11-10		11-10		11-10		11-10		11-10		12-12	
Motor Type/H.P.	PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ¹ / ₂		PSC ³ / ₄	
Cap. Mfd/Volts	10/370		7.5/370		10/370		7.5/370		10/370		10/370		10/370		40/370	
Filter Type (600 FPM)	Washable		Washable		Washable		Washable		Washable		Washable		Washable		Washable	
Filter Size inches	14x25x1		14x25x1		16x25x1		16x25x1		16x25x1		20x25x1		20x25x1		20x25x1	
(Not Supplied) mm	355x635x25		355x635x25		406x635x25		406x635x25		406x635x25		508x635x25		508x635x25		508x635x25	
1600 CFM and over inch(qty)	--		--		16x25x1 (2)		--		16x25x1 (2)		16x25x1 (2)		16x25x1 (2)		16x25x1 (2)	
mm(qty)	--		--		406x635x25(2)		--		406x635x25(2)		406x635x25(2)		406x635x25(2)		406x635x25(2)	
Min. Cool Cap. (Tons)	1.5		1.5		3		2		3		3		3		3	
Max. Cool Cap. (Tons)	3		3		4		3.5		5		5		5		5	
Gas Conversion Kits																
Nat to Propane	NAHA001LP (1172958*)															
Propane to Nat	NAHA001NG (1172960*)															
* Must be ordered from Service Parts																

Manufacturers Number (Mfr No -See Rating Plate)
ALL Models (*8MPL)

Specifications

	*8MPL 050B12		*8MPL 075B12		*8MPL 075F16		*8MPL 100F20		*8MPL 100J20		*8MPL 125J20	
General												
Input (Btuh)	50,000		75,000		75,000		100,000		100,000		125,000	
Output (Btuh)	40,000		60,000		60,000		81,000		81,000		101,000	
Temp. Rise (°F/°C)	35-65/19-36		30-60/17-33		30-60/17-33		35-65/19-36		35-65/19-36		35-65/19-36	
Electrical (Volts/Hz)	115/60		115/60		115/60		115/60		115/60		115/60	
Rating Plate Amps.	9.7		9.0		9.7		12.0		12.0		12.0	
Gas Type	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane	Nat	Propane
Transformer Size (VA)	40											
T'stat Heat Anticipator	.50											
Gas & Ignition												
Std. Main Orifices (No/Size)	2/#42	2/#54	3/#42	3/#54	3/#42	3/#54	4/#42	4/#54	4/#42	4/#54	5/#42	5/#54
Gas Valve Honeywell Regulation Type	VR 8205S SNAP											
Manifold Press. (in wc/Pa)	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490	3.5/ 872	10.0/ 2490
Ignition Type	Hot Surface											
Combustion												
Flue Outlet Size (Inches)	4		4		4		4		4		4	
Limits & Controls												
Thermal Sensor (°F/°C)	300/149		300/149		300/149		300/149		300/149		300/149	
Limit Control	See Parts List		See Parts List		See Parts List		See Parts List		See Parts List		See Parts List	
Auxiliary Limit (°F/°C)	130/54		130/54		130/54		130/54		130/54		130/54	
Std. Pressure Sw. (Part No)	1013529											
Press -Close (in wc/Pa)	-0.69/-172											
Press -Open (in wc/Pa)	-0.59/-147											
Furnace Control (Type)	Integrated											
Furnace Control On delay (Timed-secs)	30											
Furnace Control Off delay	60,100,140,180											
Blower Data												
Size Inches (D x W)	11-8		11-8		11-10		11-10		11-10		11-10	
Motor Amps/RPM	10.3/1100		8/1050		10.3/1100		10/1050		11.9/900		10/1050	
Motor Type/H.P.	PSC/1/2		PSC/1/2		PSC/1/2		PSC/1/2		PSC/1/2		PSC/1/2	
Cap. Mfd/Volts	10/370		7.5/370		10/370		10/370		10/370		10/370	
Filter Type	Washable		Washable		Washable		Washable		Washable		Washable	
Filter Size inches	14x25x1		14x25x1		16x25x1		16x25x1		20x25x1		20x25x1	
(Not Supplied) mm	355x635x25		355x635x25		406x635x25		406x635x25		508x635x25		508x635x25	
1600 CFM and over inch(qty)	--		--		16x25x1(2)		16x25x1(2)		16x25x1(2)		16x25x1(2)	
mm(qty)	--		--		406x635x25(2)		406x635x25(2)		506x635x25(2)		406x635x25(2)	
Min. Cool Cap. (Tons)	1.5		1.5		3		3		3		3	
Max. Cool Cap. (Tons)	3		3		4		5		5		5	
Gas Conversion Kits												
Nat to Propane	NAHA001LP (1172958*)											
Propane to Nat	NAHA001NG (1172960*)											
* Must be ordered from Service Parts												

15. Circulation Air Blower Data (CFM)

N8MPN/L050B12 & *8MPN/L050B12 (1)(8) * Denotes Brand

External Static Pressure (in wc/Pa)		Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
		TAP		LOW		MED L		MED H		HIGH	
		in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.10	25	472	223	704	332	1167	551	1387	655		
0.20	50	419	198	671	317	1135	536	1338	631		
0.30	75	365	172	638	301	1102	520	1288	608		
0.40	100	328	155	605	286	1069	504	1241	586		
0.50	125	290	137	572	270	1035	488	1194	563		
0.60	149	250	118	547	258	987	466	1132	534		
0.70	174	209	99	522	246	939	443	1070	505		
0.80	199	---	---	483	228	880	415	1004	474		
0.90	224	---	---	443	209	820	387	937	442		
1.00	249	---	---	370	175	753	355	858	405		

N8MPN100F14 & *8MPN100F14 (1)(8) * Denotes Brand

External Static Pressure (in wc/Pa)		Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
		TAP		LOW		MED L		MED H		HIGH	
		in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	770	363	949	448	1328	627	1760	831		
0.2	50	709	335	911	430	1282	605	1718	811		
0.3	75	648	306	873	412	1235	583	1675	790		
0.4	100	596	281	823	388	1175	555	1613	761		
0.5	125	544	257	772	364	1115	526	1551	732		
0.6	149	501	236	728	344	1076	508	1478	697		
0.7	174	457	216	684	323	1036	489	1404	663		
0.8	199	409	193	628	296	966	456	1310	618		
0.9	224	361	170	572	270	895	422	1215	573		
1	249	308	145	507	239	811	383	1093	516		

N8MPN/L075B12 & *8MPN/L075B12 (1)(8) * Denotes Brand

External Static Pressure (in wc/Pa)		Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
		TAP		LOW		MED L		MED H		HIGH	
		in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	695	328	963	454	1220	576	1559	736		
0.2	50	670	316	946	446	1202	567	1511	713		
0.3	75	644	304	928	438	1183	558	1463	690		
0.4	100	616	291	901	425	1151	543	1412	666		
0.5	125	588	277	873	412	1118	528	1361	642		
0.6	149	564	266	822	388	1068	504	1300	613		
0.7	174	540	255	771	364	1017	480	1239	585		
0.8	199	502	237	723	341	959	453	1161	548		
0.9	224	463	218	675	319	900	425	1083	511		
1	249	413	195	615	290	835	394	998	471		

N8MPN/L100F20 & *8MPN/L100F20 (2)(4)(8) * Denotes Brand

External Static Pressure (in wc/Pa)		Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
		TAP		LOW		MED L		MED H		HIGH	
		in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	831	392	1125	531	1582	747	2216	1046		
0.2	50	823	388	1124	530	1585	748	2198	1037		
0.3	75	814	384	1123	530	1588	749	2179	1028		
0.4	100	798	377	1120	529	1583	747	2127	1004		
0.5	125	781	369	1117	527	1577	744	2074	979		
0.6	149	749	353	1085	512	1559	736	1992	940		
0.7	174	717	338	1053	497	1541	727	1909	901		
0.8	199	663	313	1009	476	1457	688	1827	862		
0.9	224	609	287	964	455	1373	648	1745	824		
1	249	561	265	888	419	1307	617	1641	774		

N8MPN/L075F16 & *8MPN/L075F16 (1)(3)(8) * Denotes Brand

External Static Pressure (in wc/Pa)		Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
		TAP		LOW		MED L		MED H		HIGH	
		in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	598	282	841	397	1427	673	1861	878		
0.2	50	499	235	795	375	1406	664	1816	857		
0.3	75	400	189	748	353	1384	653	1770	835		
0.4	100	345	163	708	334	1364	644	1724	814		
0.5	125	289	136	667	315	1343	634	1677	791		
0.6	149	263	124	625	295	1299	613	1612	761		
0.7	174	236	111	582	275	1254	592	1547	730		
0.8	199	---	---	530	250	1192	563	1454	686		
0.9	224	---	---	477	225	1129	533	1360	642		
1	249	---	---	436	206	1016	479	1262	596		

N8MPN/L100J22 (2)(8)

External Static Pressure (in wc/Pa)		Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
		TAP		LOW		MED L		MED H		HIGH	
		in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	1785	842	1997	942	2292	1082	2519	1189		
0.2	50	1765	833	1970	930	2245	1059	2468	1165		
0.3	75	1741	822	1941	916	2206	1041	2410	1137		
0.4	100	1711	807	1902	898	2154	1017	2351	1109		
0.5	125	1674	790	1861	878	2097	990	2284	1078		
0.6	149	1633	771	1807	853	2036	961	2206	1041		
0.7	174	1581	746	1749	825	1965	927	2121	1001		
0.8	199	1517	716	1683	794	1883	889	2030	958		
0.9	224	1428	674	1597	754	1793	846	1928	910		
1	249	1326	626	1478	697	1667	787	1814	856		

- NOTE: (1) Data based on Bottom Only or One Side return.
 (2) Data based on Both Sides or Bottom plus One Side
 (3) 075F16 Reduce airflow by 5% if Bottom Only return.
 (4) 100F20 Reduce airflow by 10% if Bottom Only return.
 (5) 125J20 Reduce airflow by 5% if Bottom Only return.
 (6) 125J22 Reduce airflow by 10% if Bottom Only return.
 (7) 150J20 Reduce airflow by 10% if Bottom Only return.
 (8) Gray area is above maximum temperature rise range.

NOTE: (1) Gray area is above maximum temperature rise range.
 # CFM – Cubic feet per minute airflow.

L/s – Liters per second

Filter required for each return–air inlet. Airflow performance includes 1" (25.4mm) washable – 600 FPM (3.0 m/s) max filter media.

* Denotes Brand

MAX CFM (L/s) for Factory Washable Filters			
Filter Size in(mm)		CFM	L/s
14 x 25	356 x 635	1400	661
16 x 25	406 x 635	1600	755
20 x 25	508 x 635	2000	944
24 x 25	610 x 635	2500	1180
Max CFM (L/s) based on 600 FPM (3.0 m/s)			

*See Table for bellyband location on motor

Circulation Air Blower Data Continued

*8MPN/L100J20 (2)(8) * Denotes Brand

External Static Pressure (in wc/Pa)	Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
	TAP		LOW		MED L		MED H		HIGH	
	in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	773	365	1045	493	1453	686	2147	1013	
0.2	50	766	361	1029	486	1461	689	2142	1011	
0.3	75	755	356	1037	489	1469	693	2128	1004	
0.4	100	737	348	1037	489	1469	693	2113	997	
0.5	125	712	336	1020	481	1459	689	2078	981	
0.6	149	683	322	1013	478	1446	682	2029	958	
0.7	174	647	305	979	462	1424	672	1963	926	
0.8	199	603	285	942	445	1400	661	1892	893	
0.9	224	554	261	894	422	1347	636	1795	847	
1	249	497	235	828	391	1262	596	1705	805	

N8MPN/L125J20 & *8MPN/L125J20 (2)(5)(8) * Denotes Brand

External Static Pressure (in wc/Pa)	Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
	TAP		LOW		MED L		MED H		HIGH	
	in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	860	406	1149	542	1666	786	2147	1013	
0.2	50	848	400	1154	545	1622	765	2137	1008	
0.3	75	836	395	1158	546	1577	744	2126	1003	
0.4	100	821	387	1149	542	1569	740	2137	1008	
0.5	125	805	380	1140	538	1561	737	2148	1014	
0.6	149	782	369	1111	524	1539	726	2035	960	
0.7	174	758	358	1081	510	1516	715	1922	907	
0.8	199	710	335	1045	493	1472	695	1845	871	
0.9	224	661	312	1009	476	1428	674	1767	834	
1	249	614	290	925	437	1357	640	1663	785	

N8MPN/L125J22 (2)(6)(8)

External Static Pressure (in wc/Pa)	Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
	TAP		LOW		MED L		MED H		HIGH	
	in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	1901	897	2121	1001	2362	1115	2463	1162	
0.2	50	1867	881	2077	980	2303	1087	2424	1144	
0.3	75	1833	865	2033	959	2244	1059	2385	1126	
0.4	100	1789	844	1985	937	2172	1025	2301	1086	
0.5	125	1745	824	1936	914	2100	991	2217	1046	
0.6	149	1685	795	1855	875	1997	942	2125	1003	
0.7	174	1624	766	1773	837	1894	894	2033	959	
0.8	199	1533	723	1671	789	1804	851	1927	909	
0.9	224	1442	681	1569	740	1714	809	1821	859	
1	249	1329	627	1455	687	1583	747	1685	795	

*8MPN150J20 (2)(7)(8) * Denotes Brand

External Static Pressure (in wc/Pa)	Air Delivery in CFM (L/s) Furnace Rated @0.5 in wc (125 Pa) ESP									
	TAP		LOW		MED L		MED H		HIGH	
	in wc	Pa	CFM	L/s	CFM	L/s	CFM	L/s	CFM	L/s
0.1	25	1656	782	1915	904	2168	1023	2385	1126	
0.2	50	1620	765	1851	874	2129	1005	2360	1114	
0.3	75	1583	747	1787	843	2090	986	2335	1102	
0.4	100	1545	729	1742	822	2044	965	2274	1073	
0.5	125	1507	711	1697	801	1997	942	2212	1044	
0.6	149	1449	684	1647	777	1927	909	2149	1014	
0.7	174	1390	656	1596	753	1856	876	2085	984	
0.8	199	1301	614	1521	718	1755	828	1992	940	
0.9	224	1212	572	1445	682	1654	781	1898	896	
1	249	1125	531	1337	631	1561	737	1777	839	

- NOTE: (1) Data based on Bottom Only or One Side return.
 (2) Data based on Both Sides or Bottom plus One Side
 (3) 075F16 Reduce airflow by 5% if Bottom Only return.
 (4) 100F20 Reduce airflow by 10% if Bottom Only return.
 (5) 125J20 Reduce airflow by 5% if Bottom Only return.
 (6) 125J22 Reduce airflow by 10% if Bottom Only return.
 (7) 150J20 Reduce airflow by 10% if Bottom Only return.
 (8) Gray area is above maximum temperature rise range.

* Denotes Brand

NOTE: (1) Gray area is above maximum temperature rise range.

CFM – Cubic feet per minute airflow.

L/s – Liters per second

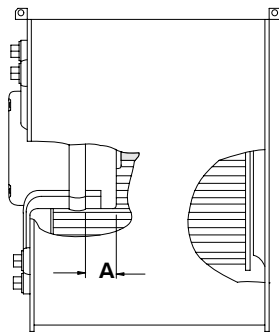
Filter required for each return–air inlet. Airflow performance includes 1" (25.4mm)

washable – 600 FPM (3.0 m/s) max filter media.

MAX CFM (L/s) for Factory Washable Filters			
Filter Size in(mm)		CFM	L/s
14 x 25	356 x 635	1400	661
16 x 25	406 x 635	1600	755
20 x 25	508 x 635	2000	944
24 x 25	610 x 635	2500	1180
Max CFM (L/s) based on 600 FPM (3.0 m/s)			

*See Table for bellyband location on motor

Bellyband Location on Motor A Dimension				
Model	*8MPN	*8MPL	inches	mm
050B12B2	X	X	1 ³ / ₈	35.1
075B12B2	X	X	1 ³ / ₈	35.1
075F16B2	X	X	1 ³ / ₈	35.1
100F14B2	X	N/A	1 ³ / ₈	35.1
100F20B2	X	X	1 ⁷ / ₈	46
100J20B2	X	X	1 ⁷ / ₈	46
125J20B2	X	X	1 ⁷ / ₈	46
150J20B2	X	N/A	1 ⁵ / ₈	41.9

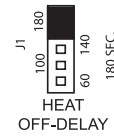
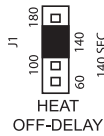
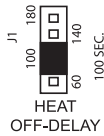
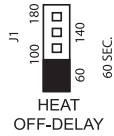


Bellyband Location on Motor A Dimension				
Model	N8MPN	N8MPL	inches	mm
050B12B2	X	X	1 ³ / ₈	35.1
075B12B2	X	X	1 ³ / ₈	35.1
075F16B2	X	X	1 ³ / ₈	35.1
100F14B2	X	N/A	1 ³ / ₈	35.1
100F20B2	X	X	1 ⁷ / ₈	46
125J22B2	X	X	1 ⁵ / ₈	41.9
125J20B2	X	X	1 ⁷ / ₈	46
125J22B2	X	X	1 ⁵ / ₈	41.9

Wiring Diagram N8MPN/L, *8MPN/L

COOL OFF DELAY: 5 SEC
 COOL OFF DELAY: 90 SEC
 HEAT ON DELAY: 30 SEC

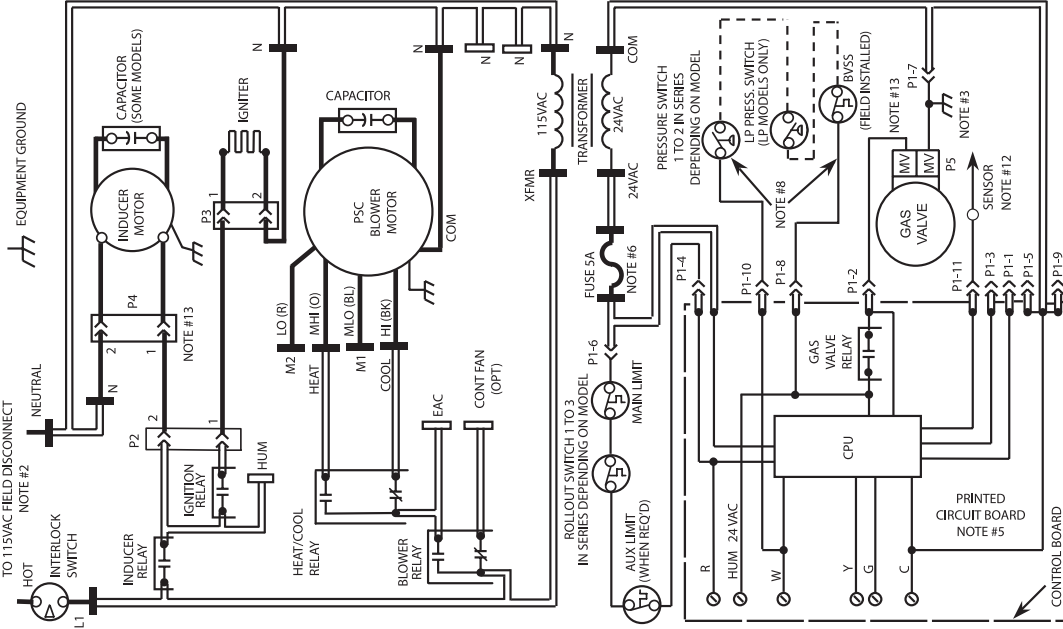
EAC + HUM 1.0A MAX
 COMBINED



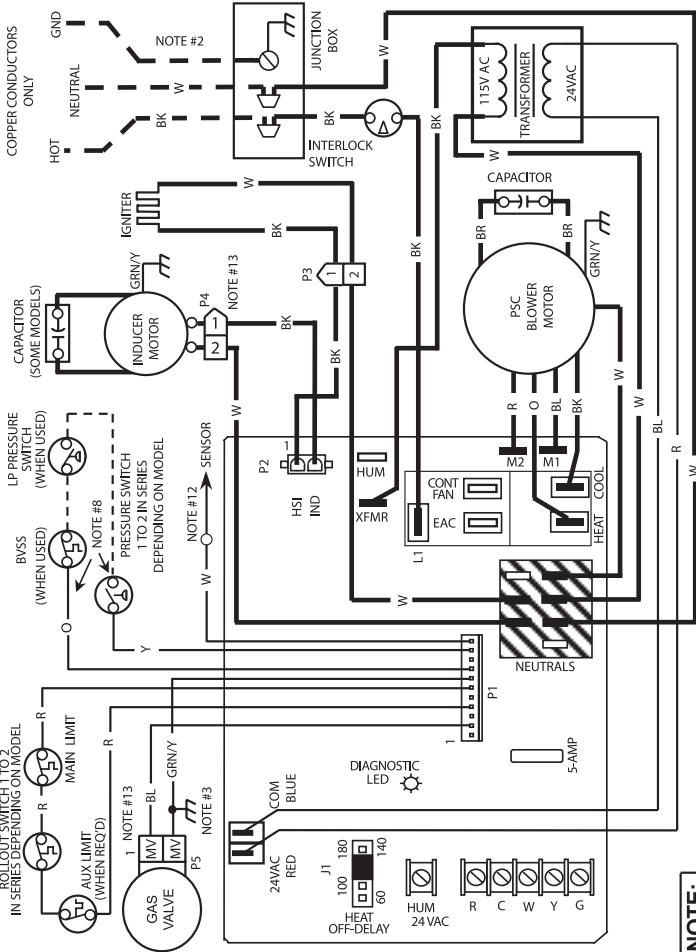
FURNACE CONTROL J1

333309-101 REV. B

LADDER DIAGRAM



WARNING: ELECTRICAL SHOCK HAZARD DISCONNECT BEFORE SERVICING



SPEED TAP CODE

BLACK	HI
ORANGE	MHI
BLUE	MLO
RED	LO

COLOR CODE

BK	BLACK
BL	BLUE
BR	BROWN
GRN/Y	GREEN/YELLOW
O	ORANGE
R	RED
W	WHITE
Y	YELLOW

- LOW VOLTAGE FACTORY
- LOW VOLTAGE FIELD
- LINE VOLTAGE FACTORY
- LINE VOLTAGE FIELD
- CONDUCTOR ON CONTROL
- JUNCTION
- UNMARKED TERMINAL
- CONTROL TERMINAL

NOTE:

- If any of the original equipment wire is replaced use wire rated 105° C.
- Use only copper wire between the disconnect switch and the furnace junction box.
- This wire must be connected to furnaces sheet metal for control to prove flame.
- Symbols are electrical representation only.
- Solid lines inside circuit board are printed circuit board traces and are not depicted as shown in the legend.
- Replace only with a 5 amp fuse.
- Blower motor speed selections are for average conditions, see installation instructions for details on optimum speed selection.
- Factory connected when LP Pressure Switch and BVSS (Chimney Adapter Accessory Kit) are not installed.
- Blower off-delay, gas heating selections are (60, 100, 140, and 180) seconds, cooling or heat pump 90 seconds.
- Ignition lockout will occur after four consecutive unsuccessful trials for ignition. Control will auto-reset after three hours.
- Blower motor and inducer motor contain internal auto-reset thermal overload switches.
- Flame sensor: 0.7 µA D.C. minimum, 2.0 - 4.0 µA nominal.
- Depending on model, P4 inducer motor leads and P5 gas valve leads may be in a single connector or two quick connectors.

INDUCED-COMBUSTION GAS FURNACE

PARTS REPLACEMENT INFORMATION GUIDE

CASING GROUP

Outer door
Blower door
Door bracket
Top filler plate
Bottom encloser

INDUCER GROUP

Housing assembly
Pressure switch
Inducer assembly
Vent elbow assembly
Inducer blower gasket

BLOWER GROUP

Blower housing
Blower hanger
Blower partition
Blower cutoff (Panel)
Blower motor
Blower wheel
Capacitor (where used)
Capacitor strap (where used)

FILTER GROUP

Filter(s) – washable (1-in.)

HEAT EXCHANGER GROUP

Heat exchanger cell
Cell Panel
Low NOx baffle (California models only)

ELECTRICAL GROUP

Control bracket
Junction box
Limit switch(es)
Circuit board
Door switch
Transformer
Wiring harness 24v
Wiring harness 120v

GAS CONTROL GROUP

Manifold
Burner Assembly
Orifice

Flame sensor
Hot surface ignitor
Gas valve
Manual reset limit switch
Burner support assembly

⚠ WARNING

FIRE, EXPLOSION, ELECTRICAL SHOCK AND CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in dangerous operation, personal injury, death or property damage.

Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, local gas supplier, or your distributor or branch for information or assistance. The qualified installer or agency must use only factory-authorized and listed kits or accessories when modifying this product.

PRODUCT NOMENCLATURE									
*	8	MP	L	0 7 5	B	1 2	B	#	
* = Brand Specific								Engineering Rev. Denotes minor change	
Brand Efficiency 8 = Non-Condensing, 80+% Gas Furnace 9 = Condensing, 90+% Gas Furnace								Marketing Digit Denotes major change	
Installation Configuration UP = Upflow DN = Downflow UH = Upflow/Horizontal HZ = Horizontal DH = Downflow/Horizontal MP = Multiposition, Upflow/Downflow/Horizontal								Cooling Airflow 08 = 800 CFM 16 = 1600 CFM 12 = 1200 CFM 20 = 2000 CFM 14 = 1400 CFM 22 = 2200 CFM	
Major Design Feature 1 = One (Single) Pipe N = Single Stage 2 = Two Pipe P = PVC Vent D = 1 or 2 Pipe T = Two Stage L = Low NOx V = Variable Speed								Cabinet Width B = 15.5" Wide J = 22.8" Wide F = 19.1" Wide L = 24.5" Wide	
								Input (Nominal MBTUH)	

* Denotes Brand (C, H, T)

Have available the product/model number and the serial number located on the unit rating plate to ensure correct replacement parts.

TO OBTAIN INFORMATION ON PARTS: Consult your installing dealer or the classified section of your local telephone directory under the "Heating Equipment" or "Air Conditioning Contractors and Systems" headings for dealer listing by brand name, or contact:

International Comfort Products, LLC
Consumer Relations Department
P.O. Box 128
Lewisburg, TN 37091, USA
931-270-4100