

# Installation Instructions

## 80+ 2-Stage & Variable Speed

### Category I Furnace

\*8MPT

\*8MPV

\* Denotes Brands (C, H, T)

See section 5 for Category I definition.

#### SAFETY REQUIREMENTS

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the furnace and in instruction manuals be alert to the potential for personal injury.

Understand the signal words **DANGER**, **WARNING**, or **CAUTION**. These words are used with the safety-alert symbol. **DANGER** identifies the most serious hazards, those that **will** result in severe personal injury or death. **WARNING** signifies a hazard that **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices that **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions that will result in enhanced installation, reliability, or operation.

Installing and servicing heating equipment can be hazardous due to gas and electrical components. Only trained and qualified personnel should install, repair, or service heating equipment.

Untrained service personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on heating equipment, observe precautions in the literature, on tags, and on labels attached to or shipped with the furnace and other safety precautions that may apply.

Follow all safety codes. In the United States, follow all safety codes including the National Fuel Gas Code (NFGC) ANSI Z223.1-2002/NFPA 54-2002. In Canada, refer to the of the National Standard of Canada Natural Gas and Propane Installation Code (NSCNGPIC) CSA B149.1-00. Wear safety glasses and work gloves. Have fire extinguisher available during start-up and adjustment procedures and service calls.

These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances, especially those that may not have kept up with changing residential construction practices. We require these instructions as a minimum for a safe installation.

International Comfort Products, LLC  
Lewisburg, TN. 37091

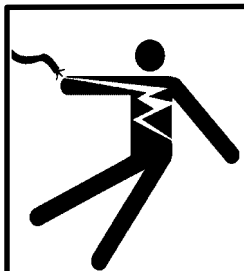


INSTALLER: Affix these instructions on or adjacent to the furnace.

CONSUMER: Retain these instructions for future reference.

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#### ⚠ WARNING

##### ELECTRIC SHOCK HAZARD

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

Turn Off All Power Before Servicing.

#### ⚠ WARNING

##### CARBON MONOXIDE POISONING AND FIRE HAZARD.

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

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

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# START-UP CHECK SHEET

(Keep this page for future reference)

Dealer Name: \_\_\_\_\_

Address: \_\_\_\_\_

Business Card Here

City, State(Province), Zip or Postal Code: \_\_\_\_\_

Phone: \_\_\_\_\_

Owner Name: \_\_\_\_\_

Address: \_\_\_\_\_

City, State(Province), Zip or Postal Code: \_\_\_\_\_

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

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

Type of Gas: Natural: ☐ LP: ☐

Blower Motor H.P.: \_\_\_\_\_

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

Which blower (DIP switch) setting is used?

Heating \_\_\_\_\_ Cooling \_\_\_\_\_ Continuous \_\_\_\_\_

Temperature of Supply Air: High Fire (°F) \_\_\_\_\_ or (°C) \_\_\_\_\_  
Low Fire (°F) \_\_\_\_\_ or (°C) \_\_\_\_\_

Temperature of Return Air: (°F) \_\_\_\_\_ or (°C) \_\_\_\_\_

Temp. Rise Hi Fire (Supply - Return): (°F) \_\_\_\_\_ or (°C) \_\_\_\_\_  
Lo Fire (Supply - Return): (°F) \_\_\_\_\_ or (°C) \_\_\_\_\_

Filter Type and Size: \_\_\_\_\_

Fan "Time ON" Setting: \_\_\_\_\_

Fan "Time OFF" Setting: \_\_\_\_\_

Dealer Comments: \_\_\_\_\_

Manual Gas Shut-Off Upstream

of Furnace/Drip-Leg? YES ☐ NO ☐

Drip-Leg Upstream of Gas Valve? YES ☐ NO ☐

Blower Speed Checked? YES ☐ NO ☐

All Electrical Connections Tight? YES ☐ NO ☐

Electrical Polarity Checked? YES ☐ NO ☐

Furnace Properly Grounded? YES ☐ NO ☐

Gas Valve Status Light OK? YES ☐ NO ☐

Gas Valve Turned ON? YES ☐ NO ☐

Measured Line Pressure When Firing Unit: \_\_\_\_\_

Calculated Firing Rate: (High & Low Fire) (See *Checks and Adjustments* Section). \_\_\_\_\_

Measured Manifold Pressure: Hi Fire \_\_\_\_\_ Lo Fire \_\_\_\_\_

Thermostat OK? YES ☐ NO ☐

Thermostat: Single Stage \_\_\_\_\_ Two Stage \_\_\_\_\_

Subbase Level? YES ☐ NO ☐

Anticipator Set? YES ☐ NO ☐ Set At?: \_\_\_\_\_

Breaker On? YES ☐ NO ☐

Date of Installation: \_\_\_\_\_

Date of Start-Up: \_\_\_\_\_

# 1. Safe Installation Requirements



## WARNING

### FIRE, EXPLOSION, AND ASPHIXIATION HAZARD

Improper adjustment, alteration, service, maintenance or installation could cause serious 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 LP gas with approved kit.)
- Install this furnace only in a location and position as specified in "2. *Installation*" of these instructions.
- Provide adequate combustion and ventilation air to the furnace as specified in "4. *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 "5. *Combustion and Ventilation Air*, 6. *Horizontal Venting* and 7. *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 "8. *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.
- 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 "2. *Installation Requirements*" of these instructions.
- This furnace is not to be used for temporary heating of buildings or structures under construction. See "2. *Installation*", item 10.
- 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, and several other items.

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 technician 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 protect against the risk of freezing could result in property damage and/or personal injury.

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.

-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.

## 2. Installation



### WARNING

#### CARBON MONOXIDE POISONING HAZARD.

Failure to properly vent this furnace or other appliances could result in death, personal injury and/or property damage.

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 5. *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).



### WARNING

#### CARBON MONOXIDE POISONING HAZARD.

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

Do NOT operate furnace in a corrosive atmosphere containing chlorine, fluorine or any other damaging chemicals, which could shorten furnace life.

Refer to 4. *Combustion & Ventilation Air* section, Contaminated Combustion Air for combustion air evaluation and remedy.

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 30" is minimum for access to the burner, controls and filter. See clearance requirements in **Figure 1**.
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 mm) 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. 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.

## 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).

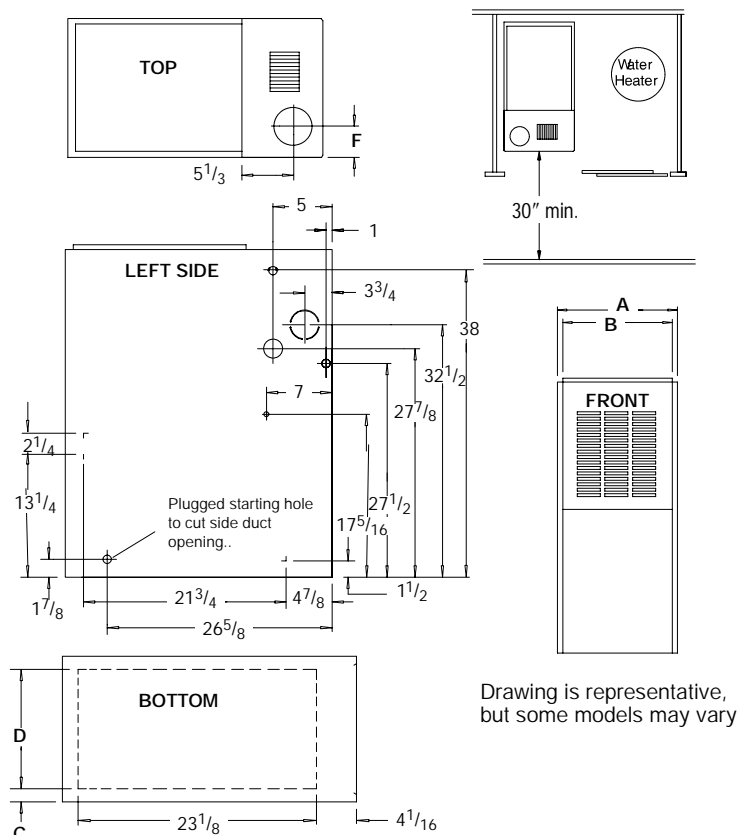
- The filters used to clean the circulating air during the construction process must be either changed or thoroughly cleaned prior to occupancy.
- The furnace, ductwork and filters are cleaned as necessary to remove drywall dust and construction debris from

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 (\*8MPT/\*8MPV)



ALL DIMENSIONS IN INCHES

### DIMENSIONAL INFORMATION

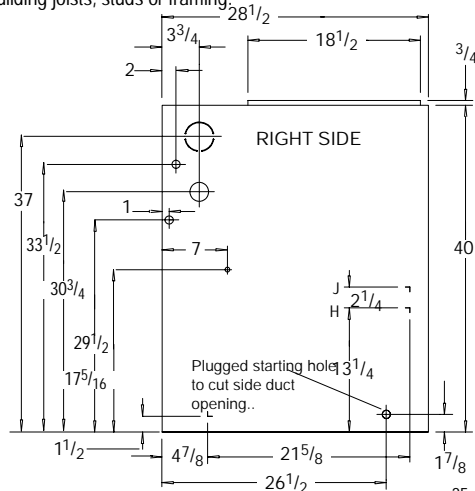
Furnace Capacity	Cabinet		Top	Bottom		Return Air Opening
	A	B	F	C	D	
*8MPT/V050B12	15 <sup>1</sup> / <sub>2</sub>	14	6	1 <sup>3</sup> / <sub>8</sub>	12 <sup>5</sup> / <sub>8</sub>	H
*8MPT/V075F14 *8MPT/V100F14	19 <sup>1</sup> / <sub>8</sub>	17 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>8</sub>	14 <sup>3</sup> / <sub>4</sub>	J
*8MPT/V100J20 *8MPT/V125J20	22 <sup>3</sup> / <sub>4</sub>	21 <sup>1</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>2</sub>	1 <sup>15</sup> / <sub>16</sub>	18 <sup>3</sup> / <sub>4</sub>	J

\* Denotes Brand

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

\*30" clearance recommended for casing 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.



25-23-44a3

**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.

## 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

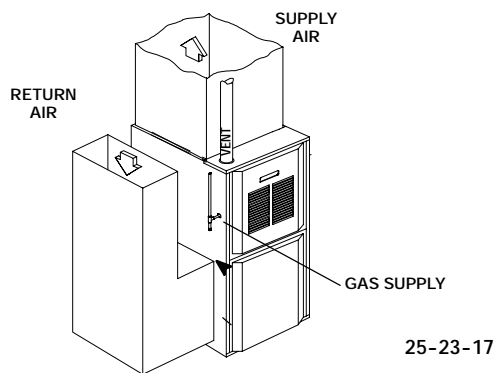
Inspect the rating plate to be certain the model number begins with "**\*8MPV**" or "**\*8MPT**". This identifies the unit as a multi-position furnace and can be installed in a Upflow, Horizontal Right, Horizontal Left or Downflow position.

### Upflow

No modifications are required for upflow installation. (See Figure 2)

Figure 2

## Typical Upflow Installation



## Horizontal

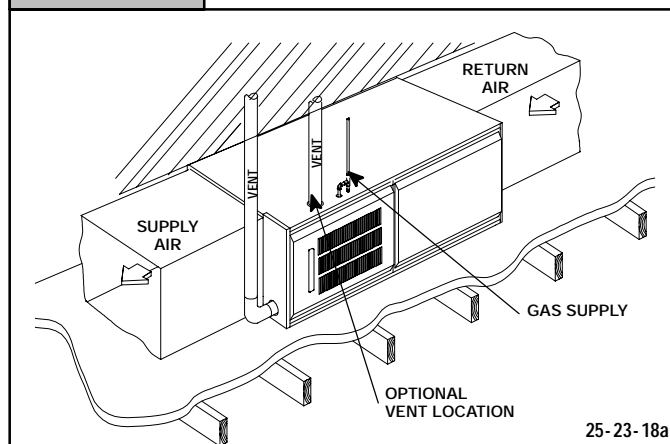
If you purchased a multi-position furnace, it can be installed horizontally in an attic, basement, crawl space, alcove, or suspended from a ceiling in a basement or utility room in either a right or left airflow position. (see **Figure 3**)

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**. **ONLY** the corner of the cabinet is allowed to contact the rafters **Figure 3**. All other clearances **MUST** be observed as shown in **Figure 1**.

Figure 3

## Typical Horizontal Installation



If the furnace is to be suspended from the floor joists in 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.

If the furnace is to be installed ground level in a crawl space, consult local codes. A concrete pad 1" to 2" thick is recommended.

Thirty inches (30") is recommended 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" 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.

Failure to install furnace on noncombustible subbase could result in death, personal injury and/or property damage.

Place furnace on noncombustible subbase on downflow applications, unless installing on noncombustible flooring.

If you purchase a Multi-position furnace (\*8MPT or \*8MPV) it may be installed in a downflow configurations, (see **Figure 4**). The minimum clearances to combustion **MUST** be maintained between the furnace and adjacent constructions, as shown in **Figure 1**.

In addition to clearances in **Figure 1**, 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 “**11. Ductwork and Filter**” (Downflow Section page 16). The outlet flange must be bent flat for downflow installation.

When installing a four-position furnace in the downflow position, the logo is to be repositioned so that it is right side-up as follows:

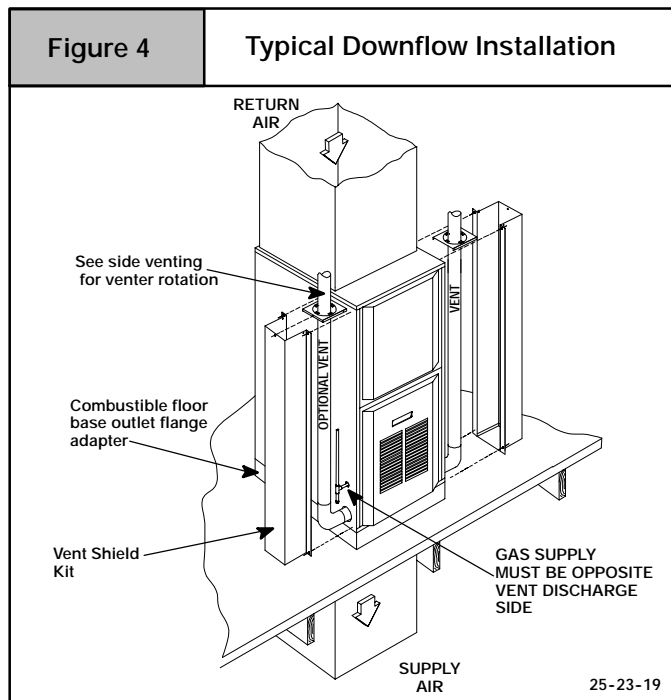
## T8MPT and T8MPV

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 by cutting apart metal retainer washers on inside of door with small diagonal cutting pliers. The retainer washers will not unscrew from the thumbscrews. Save the two thumbscrews and two plastic washers.
5. Install two thumbscrews in holes at other end of blower compartment door from where thumbscrews were removed.
  - a. A plastic washer should be on each of the two thumbscrews before inserting the thumbscrews into the blower compartment door holes.
  - b. After inserting each thumbscrew into the proper hole in the blower door, push a new metal retainer washer onto each thumbscrew as far as it will go.
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.

#### C8MPT, C8MPV, H8MPT, and H8MPV

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 4**). 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.**

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 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.

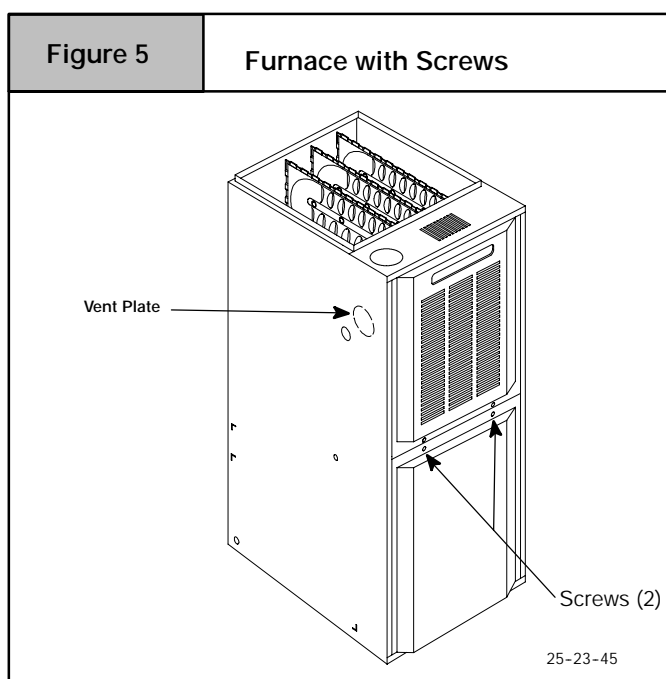
## 3. Side Venting

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 configurations 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

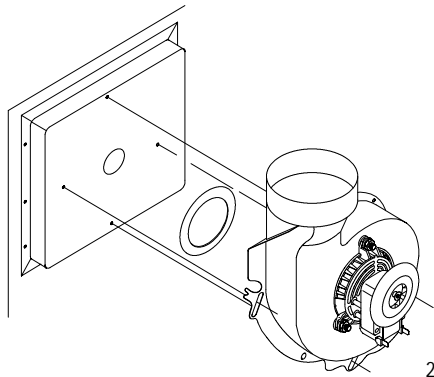
1. If gas and electrical power has already been connected to unit shut off gas and remove power from unit. Unscrew screws on burner compartment door and remove burner compartment door. See **Figure 5**.
2. Disconnect power leads to the venter motor and hose to pressure switch. Remove four(4) screws which secure the venter to the collector box, (see **Figure 6**).



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 5**).

Figure 6

Venter Gasket



4. Replace venter gasket (part # 1013540, if needed) to venter assembly with adhesive in the same location as the old one.
5. Rotate venter assembly 90° right or left from original location depending on venting configurations.
6. Tighten the four(4) screws that secure the venter assembly to the collector box. Do not overtighten. Do tighten screws enough to compress venter gasket.
7. 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 5<sup>5</sup>/<sub>16</sub>" diameter Vent Cover can be fabricated with sheet metal for all side vent installations.

## 4. Combustion & Ventilation Air



### WARNING

#### CARBON MONOXIDE POISONING HAZARD.

Failure to provide adequate combustion and ventilation air could result in death and/or personal injury.

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:

1. Section 8.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, National Fuel Gas Code (NFGC), ANSI Z223.1-2002/NFPA 54-2002 in the U.S.,
2. Sections 7.2, 7.3, 7.5, 7.6, 7.7, and 7.8 of National Standard of Canada, Natural Gas and Propane Installation Code (NSCNGPIC), CSA B149.1-00 in Canada,
3. 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 "5. 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 input rating for all gas appliances installed in the space requires outdoor air for combustion and ventilation.

### Air Openings and Connecting Ducts

1. Total maximum input ratings for all gas appliances in the space **MUST** be considered when determining free area of openings.
2. Connect ducts or openings directly to the outdoors.
3. When screens are used to cover openings, the openings **MUST** be no smaller than 1/4" mesh.
4. The minimum dimension of air ducts **MUST NOT** be less than 3" .
5. When sizing 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".

### Requirements

1. Provide confined space with sufficient air for proper combustion and ventilation of flue gases using horizontal or vertical ducts or openings.
2. **Figure 7** illustrates how to provide combustion and ventilation air when two permanent openings, one inlet and one outlet, are used.
  - a. One opening **MUST** commence within 12" of the floor and the second opening **MUST** commence within 12" of the ceiling.

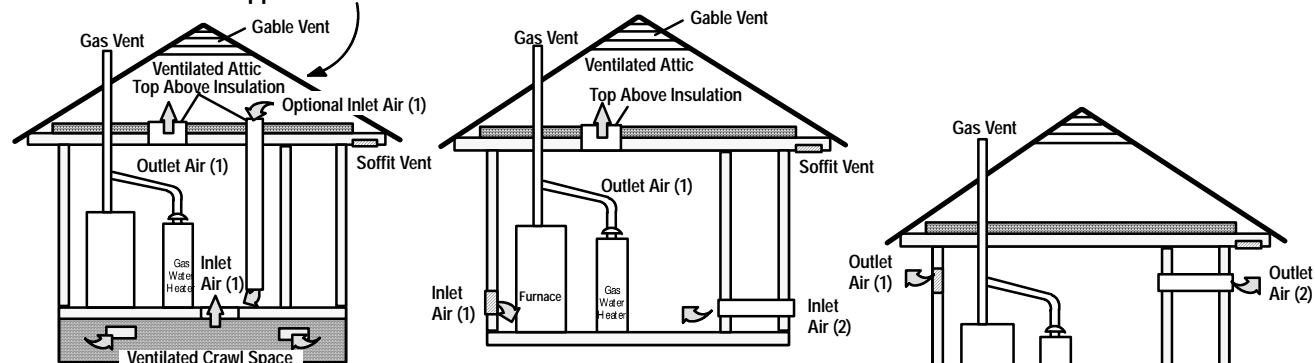


- b. Size openings and ducts per **Table 1**.

**Figure 7**

**Outdoor Air (This is ONLY a guide. Subject to codes of country having jurisdiction.)**

**This installation NOT approved in Canada**



Minimum One Inlet and One Outlet Air Supply is Required  
May be in and Combination Shown

Inlet Air Opening Must be Within 12" (300mm) of floor

Outlet Air Opening Must be Within 12" (300mm) of ceiling

(1) 1 Square Inch (6cm<sup>2</sup>) per 4000 BTUH

(2) 1 Square Inch (6cm<sup>2</sup>) per 2000 BTUH

- c. Horizontal duct openings require 1 square inch of free area per 2,000 BTUH (1,100 mm<sup>2</sup>/kW) of combined input for all gas appliances in the space (see **Table 1**).
  - d. Vertical duct openings or openings directly communicating with the outdoors require 1 square inch of free area per 4,000 BTUH (550 mm<sup>2</sup>/kW) for combined input of all gas appliances in the space (see **Table 1**).
  3. When one permanent outdoor opening is used, the opening requires:
    - a. 1 sq. in. of free area per 3,000 BTUH (700 mm<sup>2</sup>/kW) for combined input of all gas appliances in the space (see **Table 1**) and
    - b. not less than the sum of the areas of all vent connectors in the space.
- The opening shall commence within 12" of the top of the enclosure. Appliances shall have clearances of at least 1" from the sides and back and 6" 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.
4. Combination of Indoor and Outdoor Air shall have:
    - a. Indoor openings that comply with the **Indoor Combustion Air** Method below and
    - b. Outdoor openings located as required in the **Outdoor Combustion Air** Method above and
    - c. Outdoor openings sized as follows.
      - 1) Calculate the **Ratio** of all Indoor Space volume divided by required volume for **Indoor Combustion Air** Method.
      - 2) Outdoor opening size reduction **Factor** is 1 minus the **Ratio** in 1) above.
      - 3) 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 Input Rating	Minimum Free Area Required for Each Opening or Duct to Outdoors			
	Two Horizontal Ducts (sq. in./2,000 BTUH)	Single Opening (sq. in./3,000 BTUH)	Two Vertical Ducts or Openings (sq. in./4,000 BTUH)	Rd Duct (sq. in. /4,000 BTUH)
50,000	25 sq. in.	16.7 sq. in.	12.5 sq. in.	4"
75,000	37.5 sq. in.	25 sq. in.	18.75 sq. in.	5"
100,000	50 sq. in.	33.3 sq. in.	25 sq. in.	6"
125,000	62.50 sq. in.	41.7 sq. in.	31.25 sq. in.	7"
150,000	75 sq. in.	50 sq. in.	37.5 sq. in.	7"
EXAMPLE: Determining Free Area				
Furnace	Water Heater	Total Input		
100,000	+	30,000	=	(130,000 ÷ 4,000) = 32.5 Sq. In. Vertical
Furnace	Water Heater	Total Input		
100,000	+	30,000	=	(130,000 ÷ 2,000) = 65 Sq. In. 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 supply adequate combustion air could result in death and/or personal injury.

Most homes will require additional air from outdoors for combustion and ventilation. A space with at least 50 cubic feet per 1,000 BTUH input rating or homes with tight construction may need outdoor air, supplied through ducts, 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 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 (ft <sup>3</sup> )							
	Other Than Fan-Assisted Total (1,000's Btuh)			Fan-assisted Total (1,000's Btuh)				
ACH	30	40	50	50	75	100	125	150
0.60	1,050	1,400	1,750	1,250	1,875	2,500	3,125	3,750
0.50	1,260	1,680	2,100	1,500	2,250	3,000	3,750	4,500
0.40	1,575	2,100	2,625	1,875	2,813	3,750	4,688	5,625
0.30	2,100	2,800	3,500	2,500	3,750	5,000	6,250	7,500
0.20	3,150	4,200	5,250	3,750	5,625	7,500	9,375	11,250
0.10	6,300	8,400	10,500	7,500	11,250	15,000	18,750	22,500
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 54-2002, 8.3.3.2:

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

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

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

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

If:

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

$I_{\text{fan}}$  = 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 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
  1. Walls and ceilings exposed to the outdoors have a continuous, sealed vapor barrier. Openings are gasketed or sealed and
  2. Doors and openable windows are weather stripped and
  3. 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° continuously, or 55° 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 properly vent this furnace could result in death, personal injury 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. A fan assisted appliance is an appliance equipped with an integral mechanical means to either draw or force products of combustion through the heat exchanger.

**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 NSCNGPIC.

### Category I Safe Venting Requirements

Category I furnace vent installations shall be in accordance with Parts 10 and 13 of the National Fuel Gas Code (NFGC), ANSI Z223.1-2002/NFPA 54-2002; and/or Section 7 and Appendix C of the CSA B149.1-00, 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 National Fuel Gas Code and CSA B149.1 Natural Gas and Propane Installation code, based on the High-Heat 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:
  - by the **National Fuel Gas Code** (NFGC) ANSI Z223.1-2002/NFPA 54-2002 sections 10 and 13 venting requirements in the United States or
  - the **National Standard of Canada Natural Gas and Propane Installation Code** (NSCNGPIC) CSA B149.1-00

section 7 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  $\frac{5}{8}$ " 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 (21 mm/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 *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.

A 4-to-3 inch reducer is permitted at the flue collar when installing a 50,000 Btuh gas input furnace, if the installation meets all the following requirements for sizing the vent connectors and vents:

1. The National Fuel Gas Code, ANSI Z223.1/NFPA-54-2002, sections 10.5.3.1(1), 10.6.3.1(2), 10.10.3.1, 13.1.2, 13.1.10, and 13.2.21(1) through (3) in the U.S. or
2. The Natural Gas and Propane Installation Code CSA B149.1-00, sections 7.13.1(b), 7.13.2(b), 7.18.5(b), and Appendix C-GVR no. 2. in Canada.

## 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 8)
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.

## Venting to Existing Masonry Chimney

**NOTE:** The tables and notes referred to below are found in the most recent printing of the **NFGC** venting tables.

Use the NFGC or NSCNPGIC Tables to size the chimney or vent. **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 NFGC tables 13.1 or 13.2 or a listed, metal lining system, sized in accordance with the NFGC section 13.1.7 for a single appliance or 13.2.19 for multiple appliances or NSCNPGIC Appendix C, section 10.; or venting into a masonry chimney is premitted as outlined with use of an optional listed masonry chimney kit. (See Section 7. *Masonry Chimney Venting* of these instructions)

Listed, corrugated metallic chimney liner systems in masonry chimneys shall be sized by using **NFGC or NSCNPGIC** tables for dedicated and common venting with the maximum capacity reduced by 20% (0.80 X maximum capacity) and the minimum capacity as shown in the applicable table. 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.

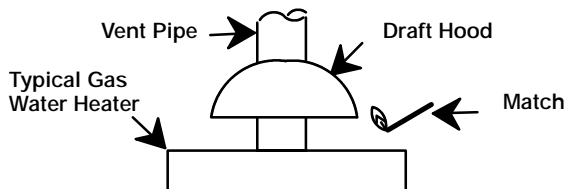
## Combined Venting into a Masonry Chimney

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

**NOTE:** See section 7. *Masonry Chimney Venting*.

Figure 8

Vent Check



**NOTE:** If flame pulls towards draft hood, this indicates sufficient infiltration air.

## 6. Horizontal Venting

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### 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 appliance 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.

### Vent Termination

#### Venting Through a Non-Combustible and Combustible Wall

**Consult External Power Venter manufacturer instructions.**

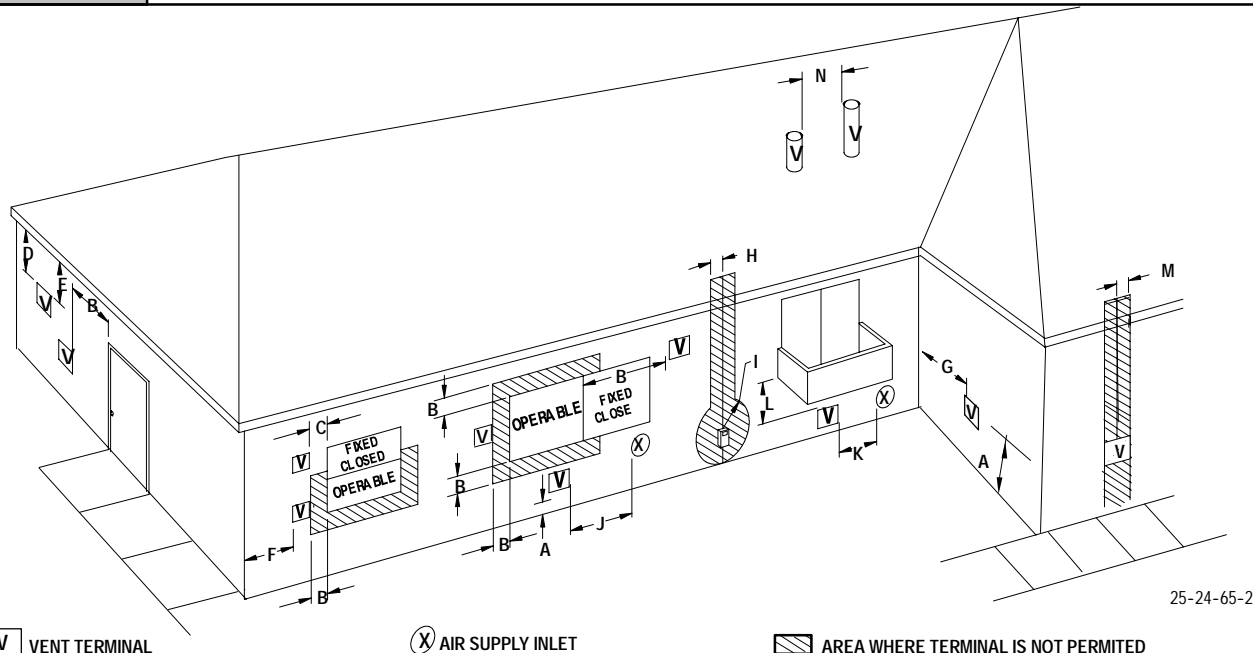
Select the power venter to match the Btuh input of the furnace being vented. Follow all of the manufacturer's installation requirements included with the power venter for:

- venting installation,
- vent terminal location,
- preventing blockage by snow,
- protecting building materials from degradation by flue gases,
- see **Figure 9** 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 9

## 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	6" (15 cm) for appliances ≤ 10,000 BTUH (3kW), 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	6" (15 cm) for appliances ≤ 10,000 BTUH (3kW), 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 from a plumbing vent stack	3' (91 cm)	3' (91 cm)

(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 manufacture's installation instructions.

## Notes:

- The vent for this appliance shall not terminate
  - Over public walkways; or
  - Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or property damage; or
  - Where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.
- 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.

## 7. Masonry Chimney Venting

### Chimney Inspection

All masonry chimney construction must conform to Standard ANSI/NFPA211–2000 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 “The Chimney Inspection Chart” **Figure 10**. 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 except as specified in the listed kit.

### 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 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 1993 ASHRAE Fundamentals Handbook, Chapter 24, Table 1 (United States) and 2 (Canada), or use the 99.6% heating db temperatures found in the 1997 or 2001 ASHRAE Fundamentals Handbook, Climatic Design Information chapter, Table 1A (United States) and 2A (Canada).



## WARNING

### CARBON MONOXIDE POISONING, FIRE AND EXPLOSION HAZARD.

Failure to properly vent this furnace could result in death, personal injury 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 211–2000 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 and 13.2.20 of the NFGC 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 NFGC, 13.1.9 and 13.2.20 regarding alternative venting design and the exception, which cover installations such as the Chimney Adapter Kits NAHA001DH and NAHA002DH, which are listed for use with these furnaces.

The Chimney Adapter Kit are listed alternative venting design 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 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.

# 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)	INTERNAL AREA OF CHIMNEY (SQ IN.)			
	12	19	28	38
6	74	119	178	257
8	80	130	193	279
10	84	138	207	299
15	NR	152	233	334
20	NR	NR	250	368
30	NR	NR	NR	404

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

VENT HEIGHT (FT)	INTERNAL AREA OF CHIMNEY (SQ IN.)			
	12	19	28	38
17 to 26°F	Local 99% Winter Design Temperature: 17 to 26°F*			
	6	0	55	99
	8	52	74	111
	10	NR	90	125
	15	NR	NR	167
	20	NR	NR	212
5 to 16°F	Local 99% Winter Design Temperature: 5 to 16°F*			
	6	NR	78	121
	8	NR	94	135
	10	NR	111	149
	15	NR	NR	193
	20	NR	NR	293
-10 to 4°F	Local 99% Winter Design Temperature: -10 to 4°F*			
	6	NR	NR	145
	8	NR	NR	159
	10	NR	NR	175
	15	NR	NR	NR
	20	NR	NR	NR
-11°F or lower	Local 99% Winter Design Temperature: -11°F or lower* <b>Not recommended for any vent configuration</b>			

\* The 99% Winter Design Dry-Bulb (db) temperatures are found in the 1993 ASHRAE Fundamentals Handbook, Chapter 24, Table 1 (United States) and 2 (Canada), or use the 99.6% heating db temperatures found in the 1997 or 2001 ASHRAE Fundamentals Handbook, Climatic Design Information chapter, Table 1A (United States) and 2A (Canada).

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:

- 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 NFPA, Section 10.9 for additional information on condensate drains.
- 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 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% 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.

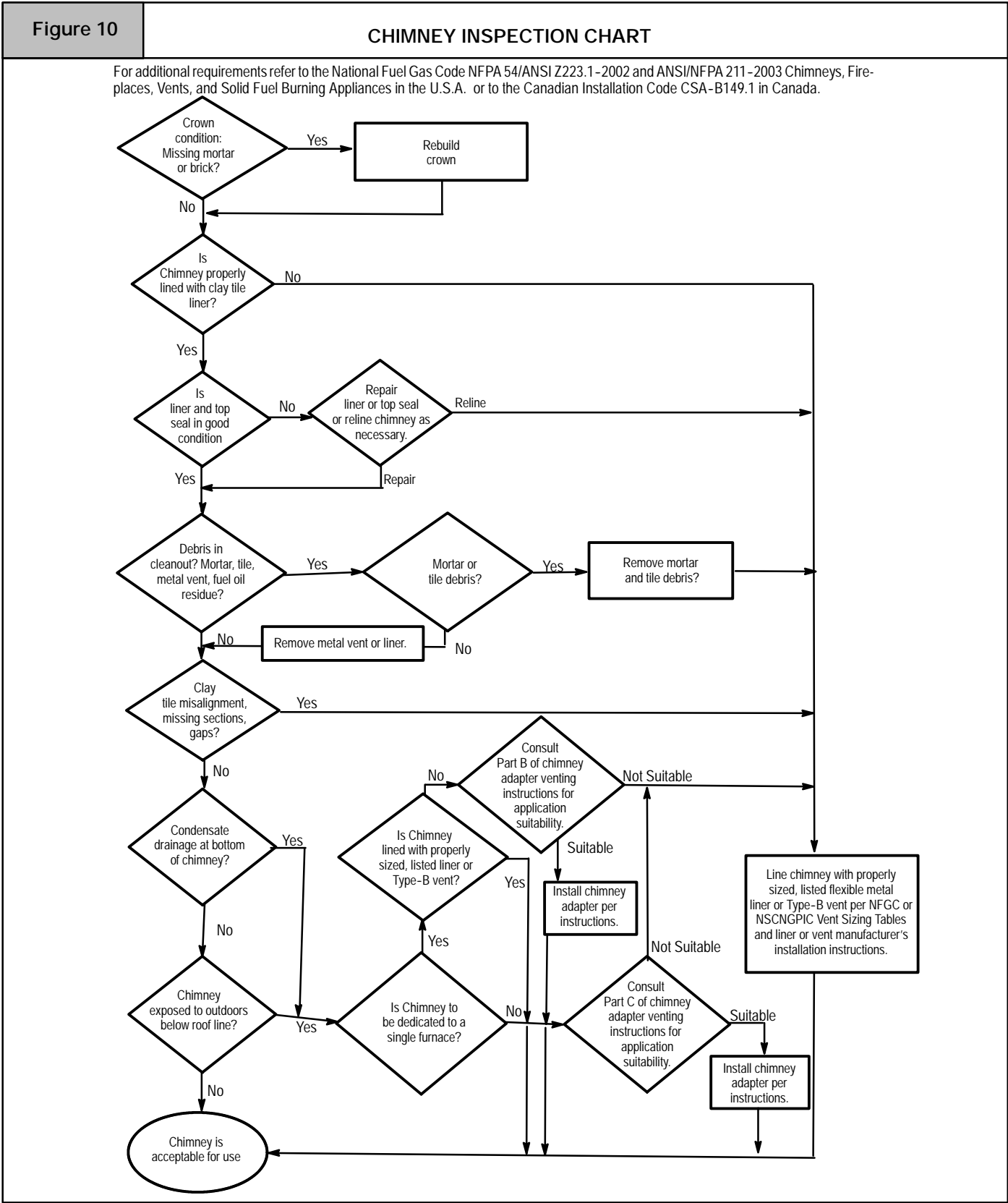
To prevent condensation in the furnace and vent system, the following precautions must be observed:

- The return-air temperature must be at least 60°F db except for brief periods of time during warm-up from setback at no lower than 55°F db or during initial start-up from a standby condition.
- 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'.
- 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.
- 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 safety warnings exactly could result in serious 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 LP 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 7** or **Table 8** for manifold pressures.

Table 3		Gas Pressures		
Gas Type	Supply Pressure			
	Recommended	Max.	Min.	
Natural	7"	14"	4.5"	
Propane	11"	14"	11"	

### Gas Piping Requirements

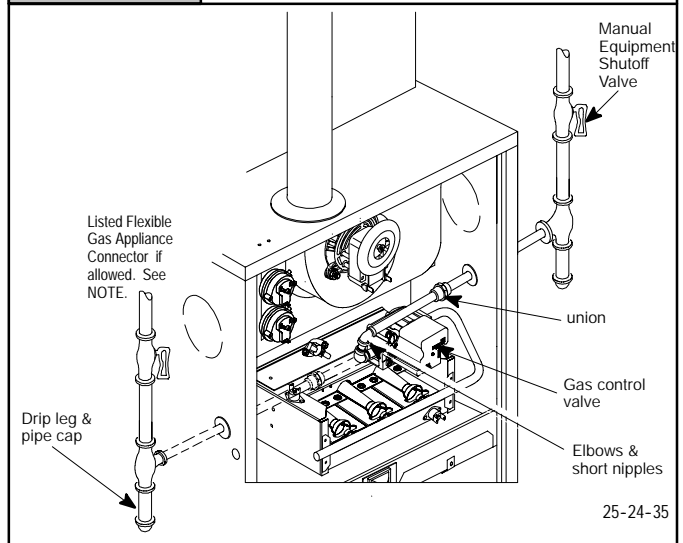
**NOTE:** The gas supply line must be installed by a qualified service technician in accordance with all building codes.

**NOTE:** In the state of Massachusetts.

- a. Gas supply connections **MUST** be performed by a licensed plumber or gas fitter).
  - b. When flexible connectors are used, the maximum length shall not exceed 36" (915 mm).
  - c. When lever handle type manual equipment shutoff valves are used, they shall be T-handle valves.
  - d. The use of copper tubing for gas piping is **NOT** approved by the state of Massachusetts.
1. Install gas piping in accordance with local codes, or in the absence of local codes, the applicable national codes.
  2. 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 11**.
  3. Use black iron or steel pipe and fittings or other pipe approved by local code.
  4. Use pipe thread compound which is resistant to natural and LP gases.
  5. Use ground joint unions and install a drip leg no less than 3" long to trap dirt and moisture before it can enter gas control valve inside furnace.
  6. Provide a 1/8" NPT plugged tapping for test gauge connection immediately up stream of gas supply connection to furnace.

Figure 11

Typical Gas Piping (\*8MPT/\*8MPV)



### WARNING

#### FIRE HAZARD

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

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

7. Use two pipe wrenches when making connections to prevent 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.

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

#### Left Side Gas Supply Piping

Gas line can be installed directly to the gas valve through the hole provided in the left side of the cabinet. See **Figure 11**

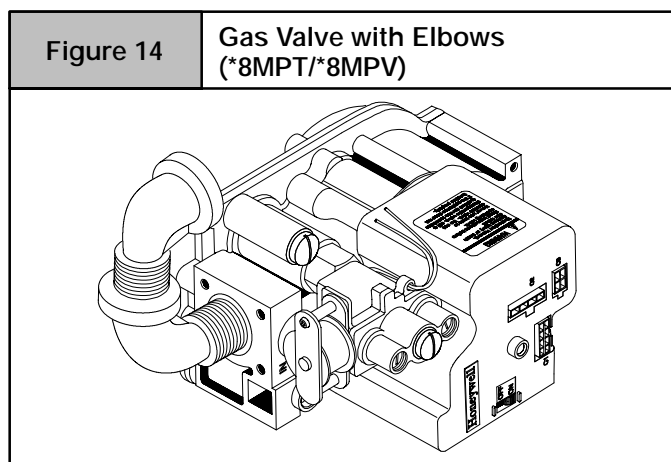
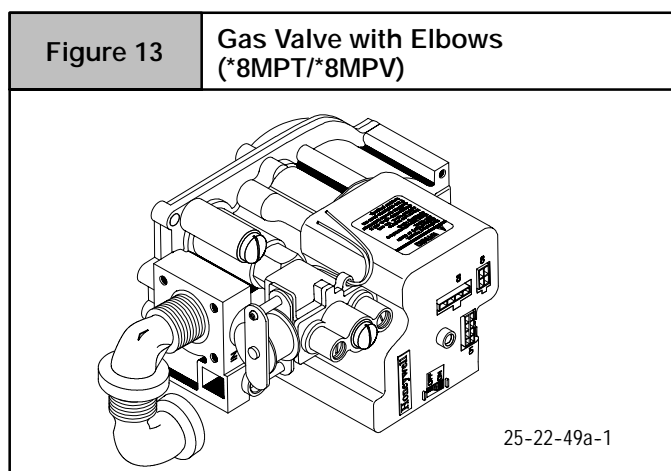
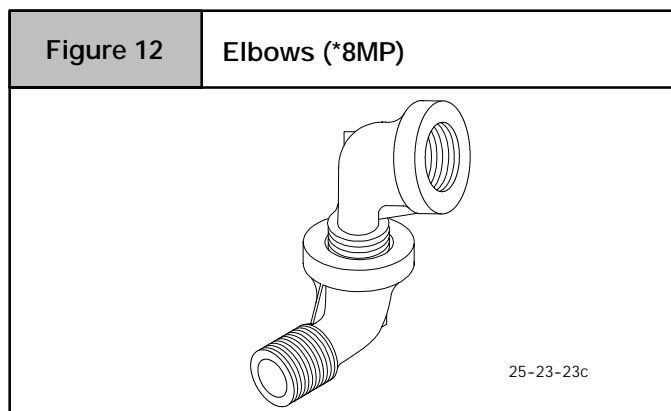
#### Right Side Gas Supply Piping

Two(2) 90° street elbows or two(2) 90° standard elbows and two(2) close nipples are required for right side gas supply. See **Figure 11**.

#### Piping with Street Elbows

1. 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 12**.

2. 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 bottom of the gas valve. An additional  $\frac{1}{2}$  turn will be required in step 3. Turn open end of inlet elbow to face the right side of the furnace ( $\frac{1}{4}$  turn), see **Figure 13**.
3. Turn assembly an additional  $\frac{1}{2}$  turn to position inlet near the top of the gas valve. In line with gas opening on right side of furnace, see **Figure 11** and **Figure 14**.



4. 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 12**.
2. Follow steps 2 through 4 **Piping with Street Elbows**.

## ⚠ WARNING

### FIRE OR EXPLOSION HAZARD.

Failure to properly install metal gas connector could result in death, bodily injury 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 control valve and extend a minimum of 2" outside furnace.

### Additional LP Piping Requirements

- Have a licensed LP 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 LP gas is recommended.

## ⚠ WARNING

### FIRE OR EXPLOSION HAZARD.

A natural gas or LP gas leak ignited by an open flame or spark could result in death, personal injury and/or property damage.

Natural gas is lighter than air and will rise. Liquefied petroleum (LP) 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 manual 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 system.
- To check for leaks apply soap suds or a liquid detergent to each joint. Bubbles forming indicate a leak.
- 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 safety warnings exactly could result in serious injury, death, and/or property damage.

Turn OFF electrical power at fuse box or service panel 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 70-2002 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 63° F (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 (0.8 amps total for EAC and HUM). Ampacity can be determined by using the NEC or CEC.

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

### J-Box Relocation

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. Move J-box to alternate location and attach using two screws removed from left side location.
4. 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

The 2-stage furnace control will operate with either a single stage or a two stage heating thermostat and will provide 2-stage heating operation.

For **single-stage** thermostat installations, the R and W wires from the thermostat connect to the R and W1 connections on the furnace control.

**Note:** The fourth (4th) DIP switch should be in the off position for the furnace to operate properly with a single-stage thermostat. Failure to change DIP switch with single stage thermostat will result in Low Fire operation ONLY. (See **Figure 17** and wiring diagram)

During operation, the furnace will operate on low-fire for up to 12 minutes. If the heat request exists for more than 12 minutes, the furnace will automatically shift to the high fire mode for the remaining duration of the heating cycle.

For **2-stage** thermostat installations, the R, W1 and W2 wires from the thermostat connect to the R, W1 and W2 connections on the furnace control. During operation, the furnace will shift from low fire to high fire as requested by the thermostat.

The thermostat heat anticipator should be adjusted to a 0.10 setting for both types of thermostats.

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 fan control. (See **Figure 15**)

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

### 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.

**NOTE: Do NOT exceed 115V/0.8 amp. maximum current load for both the EAC terminal and the HUM terminal combined.**

**NOTE:** The humidifier will be powered when the furnace is fired and the circulating air blower comes on. The electronic air cleaner will be powered anytime the thermostat calls for air movement. However, the electronic air cleaner is **NOT** energized during continuous fan operation controlled by the electronic fan control.

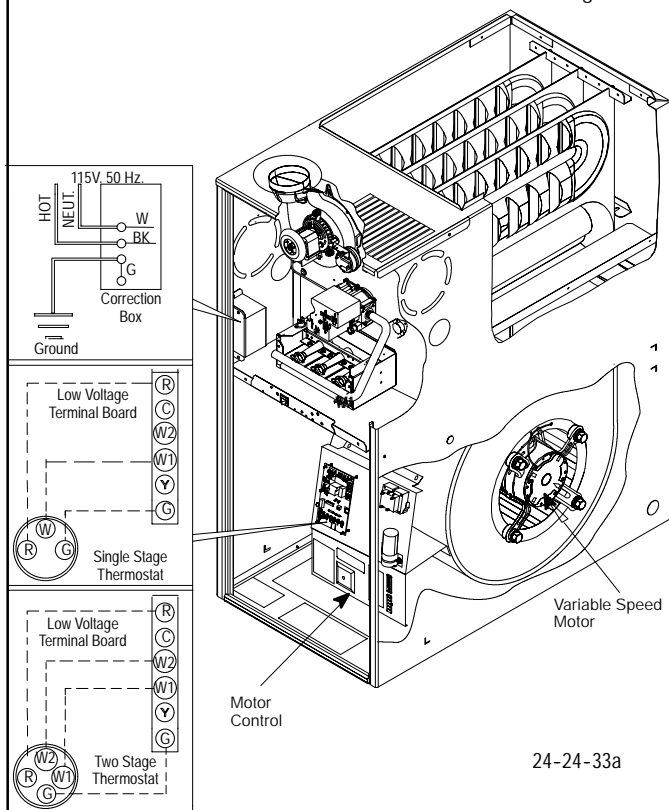
#### Dehumidification (\*8MPV ONLY)

The fan control is wired for 24 VAC normally-open (N/O) dehumidistat connection. Connect dehumidistat to the **Y** terminal and the 1/4" male quick connect **Y2** terminal on the fan control (See **Figure 17** and "Furnace Wiring Diagram"). A 20% reduction of cooling airflow will occur when the **Y2** dehumidistat terminal is energized by being connected to **Y** during a call for cooling from the thermostat.

Figure 15

### Electrical Connections \*8MPV

NOTE: Junction Box can be mounted to either the left or right side.



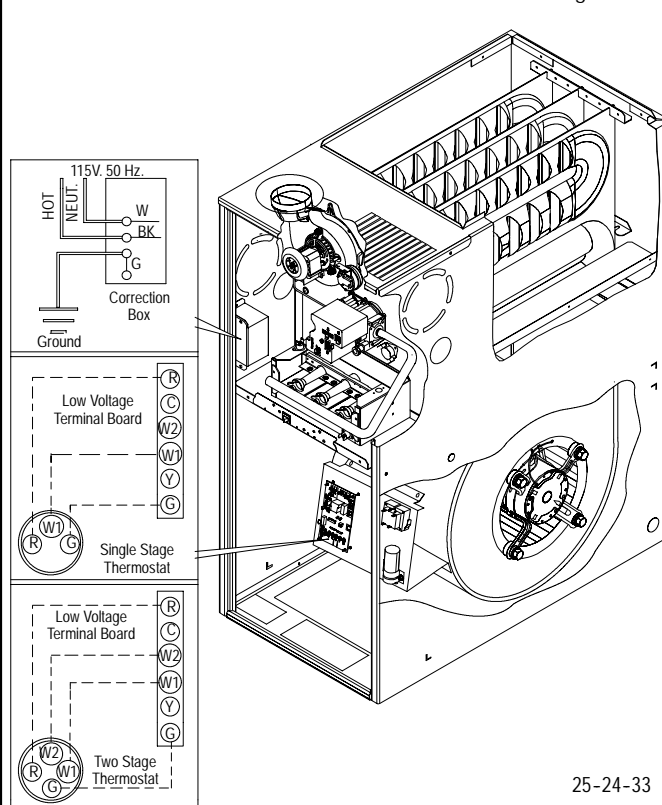
NOTE: 115 VAC/60Hz/single-phase  
Operating voltage range\*: 127 max, 104 min.

\* Permissible limits of voltage at which unit will operate satisfactorily

Figure 16

### Electrical Connections \*8MPT

NOTE: Junction Box can be mounted to either the left or right side.



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

\* Permissible limits of voltage at which unit will operate satisfactorily

## Fan Control

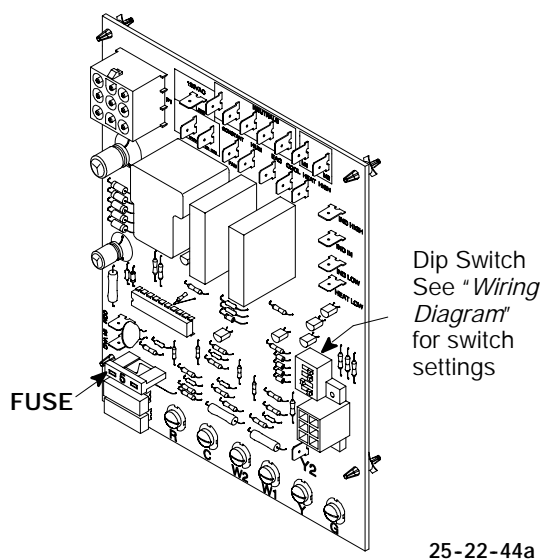
The fan control is preset at the factory with **ON** delay of 30 seconds in the heating mode. The blower **OFF** timing is preset at 140 seconds. If desired, the fan **OFF** delay can be reset to obtain the longest delay times while still maintaining comfort levels. See "Furnace Wiring Diagram".

## Control Center Fuse

The 24V circuit contains a 5-amp, automotive-type fuse located on control center. (See **Figure 17**) Any electrical shorts to 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 17

## Fan Timer Connections



## 10. Ductwork and Filter (Upflow/Horizontal)



### WARNING

#### CARBON MONOXIDE POISONING HAZARD.

Failure to properly seal duct could result in death and/or personal injury.

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.

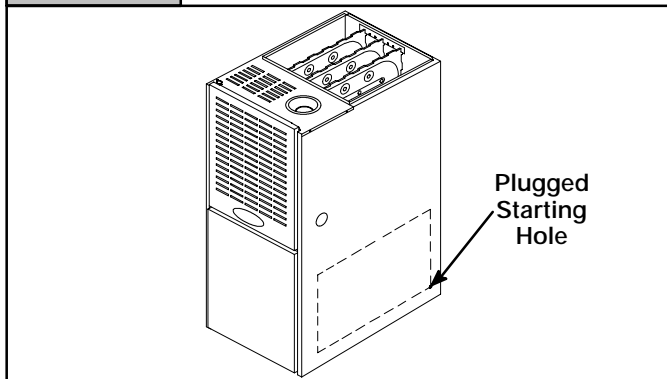
### Duct Connections

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

Side connections can be made by cutting out the embossed area shown in **Figure 18**. A plugged hole is provided at each furnace side duct location to help start cutting the opening.

Figure 18

Cutting Side Return Air Opening



Bottom returns can be made by removing the knockout panel in the furnace base. Do **NOT** remove knock-out except for a bottom return.

### 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.

### 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 safety warning exactly could result in serious injury, death, and/or property 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" of insulation with outdoor type vapor barrier.
- Ductwork installed in an indoor unconditioned space requires a minimum of 1" 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 may not be 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)		
	Internal Filter	External Filter Rack	
Cabinet Width	Bottom	Bottom	Side+
15 1/2"	14 X 25"	14 X 25"	14 X 25" or 16 X 25"
19 1/8"	16 X 25" *	16 X 25" *	16 X 25" *
22 3/4"	20 X 25" *	20 X 25" *	16 X 25" *

\* Greater than 1600 CFM requires both (left and right) side return filter racks in upflow position.

+ 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.
- Disposable, low velocity filters are based on a maximum air flow of 300 FPM when used with with external filter grille.

**⚠ CAUTION**

**REDUCED FURNACE LIFE HAZARD**

Failure to follow caution instructions may result in reduced furnace life.

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

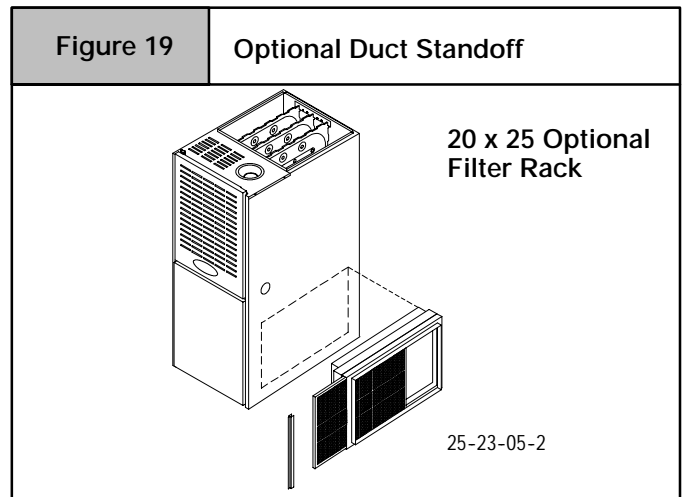
Filters supplied with the furnace are rated at a maximum of 600 fpm air velocity and sized for the furnace's airflow rate. Replacement filters must be of equivalent type, size, and rating except as described below.

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 or less CFM rating are supplied with a 16" x 25" high-velocity filter and rack. On these models the supplied filter may be installed internally for bottom return or the supplied filter and rack may be mounted externally for bottom return.
- The furnaces with greater than 1600 CFM require that bottom return or both (left and right) side returns are used. Two side return filters and racks are required. Filter racks must be mounted externally. (See **Figure 20**.) If return air must be on one side only, an optional 20" x 25" filter standoff rack kit can be used. (See **Figure 19**.) For bottom return, an internal filter can be used or a filter rack kit can be mounted externally.

**NOTE:** The 20" x 25" standoff side filter rack gives more filter area but does not provide more air. (See **Figure 19**.) To achieve 2000 CFM 2 side returns are still needed. (See **Figure 21**.)

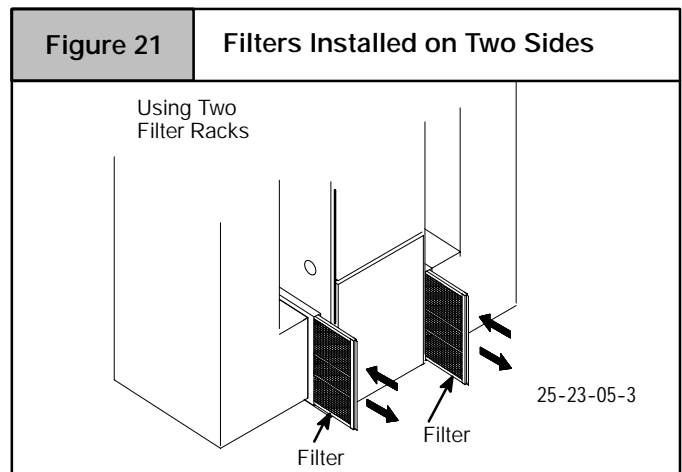
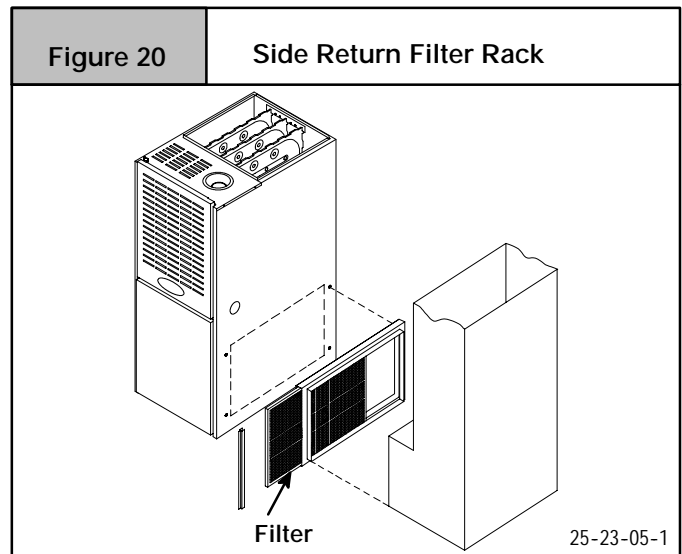
**NOTE:** Disposable, low-velocity filters may be replaced with washable, high-velocity filters providing they meet the minimum size areas for 300 FPM or less. Washable, high-velocity filters can be replaced **ONLY** with same type and size filter.



## Filters Rack Installation

### Side Return

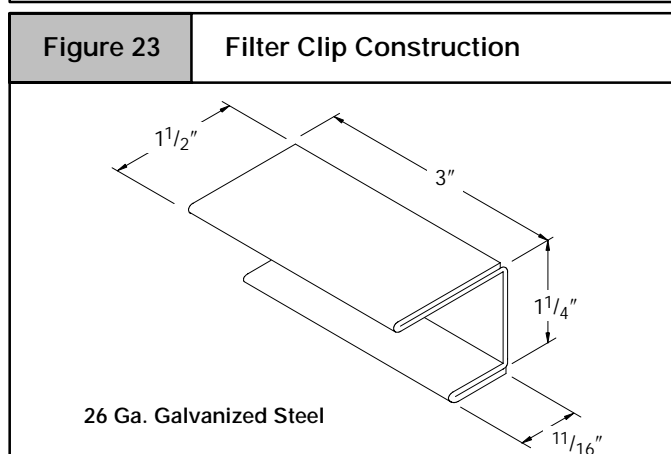
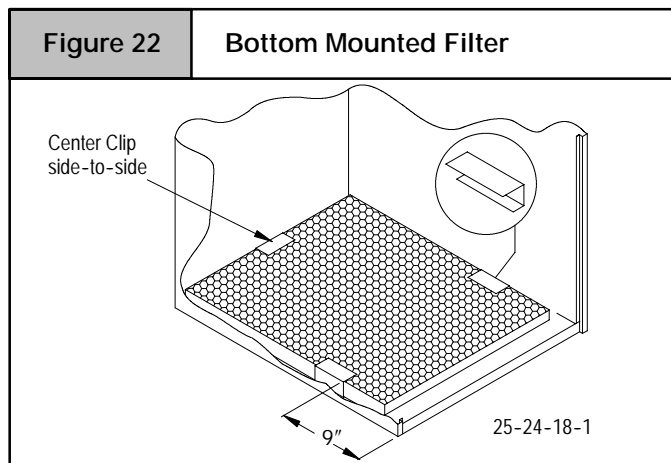
Center the filter rack on the side panel, flush with the bottom edge of the furnace. Mark the fastening holes. Drill the fastening holes in the side panel and fasten the filter rack in place with sheet metal screws. See **Figure 20** & **Figure 21**.



### 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 wid-

er end of the clips toward the blower, as shown in **Figure 22**. Clips may be obtained from your distributor or fabricated from sheet metal (**Figure 23**). 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 on the heat exchanger. 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.

## 11. Ductwork and Filter (Downflow)

**⚠ WARNING**  
**CARBON MONOXIDE POISONING HAZARD.**  
 Failure to properly seal duct could result in death and/or personal injury.  
 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**  
**BURN HAZARD.**  
 Failure to properly install vent shield could result in bodily injury.  
 The vent may be hot.

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

### 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) within reach of children. Vent shield attaches to side of furnace to cover vent pipe. See **Figure 4** in "2. Installation" section.

### 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.





## WARNING

### FIRE HAZARD.

Failure to install furnace on noncombustible subbase could result in death, personal injury and/or property damage.

Place furnace on noncombustible subbase on downflow applications, unless installing on non-combustible flooring.

## 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 Sub-base 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  $1\frac{1}{4}$ " shorter and  $1\frac{1}{8}$ " narrower than the minimum required size of the opening in the floor. This is done to maintain a 1" 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 24** and **Figure 25**.
4. Drop the plenum through the opening in the base. The flange of the plenum should rest on top of the combustible floor base.

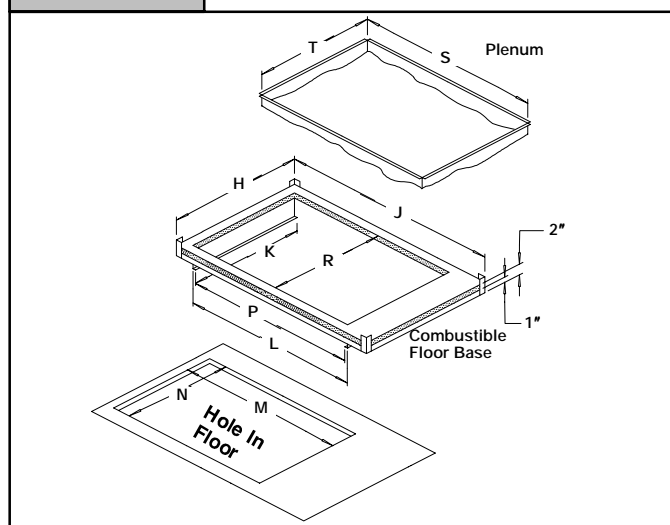
Table 5 Sub-bases for Combustible Floors Dimensions										
Sub-base for Combustible Floors Part Number	Sub-base for Combustible Floor Dimensions				Opening In Floor		Opening In Base For Plenum		Typical Plenum Dimensions	
	H*	J*	K**	L	M	N	P	R	S	T
<b>Subbase for Furnace Only</b>										
NAHH001SB	15 $\frac{11}{16}$	28 $\frac{3}{4}$	14 $\frac{9}{16}$	16	16 $\frac{1}{4}$	14 $\frac{5}{8}$	15	13 $\frac{1}{2}$	15	13 $\frac{1}{2}$
NAHH002SB	19 $\frac{5}{16}$	28 $\frac{3}{4}$	18 $\frac{3}{16}$	16	16 $\frac{1}{4}$	18 $\frac{1}{4}$	15	17 $\frac{1}{8}$	15	17 $\frac{1}{8}$
NAHH003SB	22 $\frac{15}{16}$	28 $\frac{3}{4}$	21 $\frac{13}{16}$	16	16 $\frac{1}{4}$	21 $\frac{7}{8}$	15	19 $\frac{3}{4}$	15	19 $\frac{3}{4}$
<b>Subbase for Coil Box</b>										
NAHH004SB	15 $\frac{11}{16}$	20 $\frac{9}{16}$	14 $\frac{9}{16}$	16	16 $\frac{1}{4}$	14 $\frac{5}{8}$	15	13 $\frac{1}{8}$	15	13 $\frac{1}{2}$
NAHH005SB	19 $\frac{5}{16}$	20 $\frac{9}{16}$	18 $\frac{3}{16}$	16	16 $\frac{1}{4}$	18 $\frac{1}{4}$	15	17 $\frac{1}{8}$	15	17 $\frac{1}{8}$
NAHH006SB	22 $\frac{15}{16}$	20 $\frac{9}{16}$	21 $\frac{13}{16}$	16	16 $\frac{1}{4}$	21 $\frac{7}{8}$	15	19 $\frac{3}{4}$	15	19 $\frac{3}{4}$

\* Outside Dimension

\*\* Base Spacer Side To Side

Figure 24

### Exploded View of Sub-Base for Furnace ONLY



## Sub-base for Combustible Floors- Downflow Coil Adapter Box

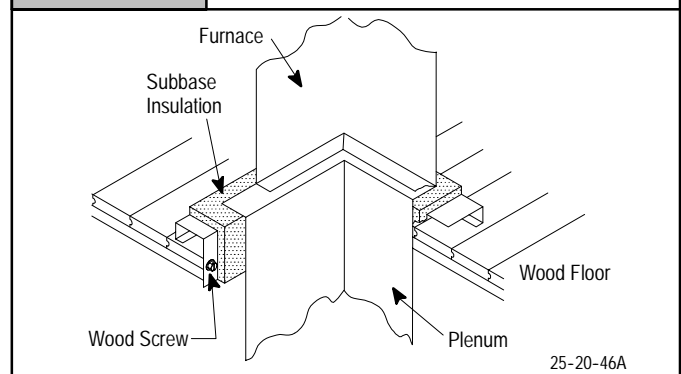
The sub-base for combustible floors is not required when a downflow furnace, **used with a downflow coil box**, is set on combustible flooring.

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  $1\frac{1}{4}$ " shorter and  $1\frac{1}{8}$ " narrower than the minimum required size of the opening in the floor. This is done to maintain a 1" clearance between the floor and the plenum.

Figure 25

### Setting the Base

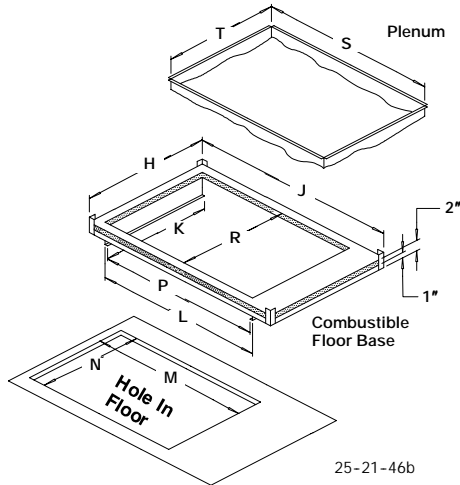


2. Fabricate the plenum to the dimensions given in **Table 5**. Note that the dimensions given are outside dimensions.

- 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 26** and **Figure 27**.
- Drop the plenum through the opening in the base. The flange of the plenum should rest on top of the combustible floor base

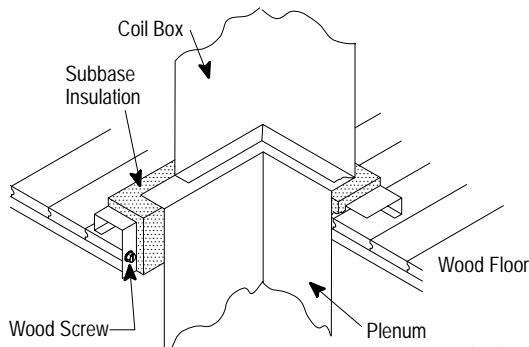
**Figure 26**

**Exploded View of Base for Downflow Cased Coil**



**Figure 27**

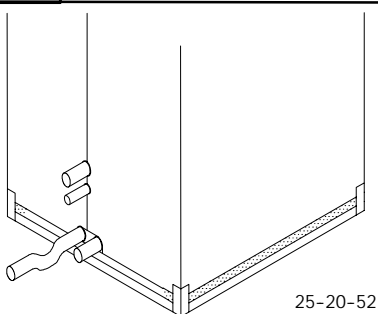
**Setting the Base**



Consideration must be given to the height of the base to allow for easy installation of the condensate drain. See **Figure 28**. 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

**Figure 28**

**Condensate Line Raised by Base**



## 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

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 used.

## 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 safety warning exactly could result in serious injury, death, and/or property damage.

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

- When a 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" of insulation with outdoor type vapor barrier.
- Ductwork installed in an indoor unconditioned space requires a minimum of 1" of insulation with indoor type vapor barrier.

## Filters

A filter **MUST** be used.

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

See **Table 6** for required high-velocity filter sizes.

<b>Table 6 High Velocity Air Filter Sizes (max. 600 FPM)</b>		
<b>Cabinet Width</b>	<b>Internal Filter</b>	<b>External Filter Rack</b>
15 <sup>1</sup> / <sub>2</sub> "	14" X 25"	14" X 25"
19 <sup>1</sup> / <sub>8</sub> "	16" X 25"	16" X 25"
22 <sup>3</sup> / <sub>4</sub> "	20" X 25"	20" X 25"

Use either filter type:

- Washable, high-velocity filters are based on a maximum air flow rating of 600 FPM.
- Disposable, low velocity filters are based on a maximum air flow of 300 FPM when used with with external filter grille.

**⚠ CAUTION**

**REDUCED FURNACE LIFE HAZARD**

Failure to follow caution instructions may result in reduced furnace life.

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

Filters supplied with 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.

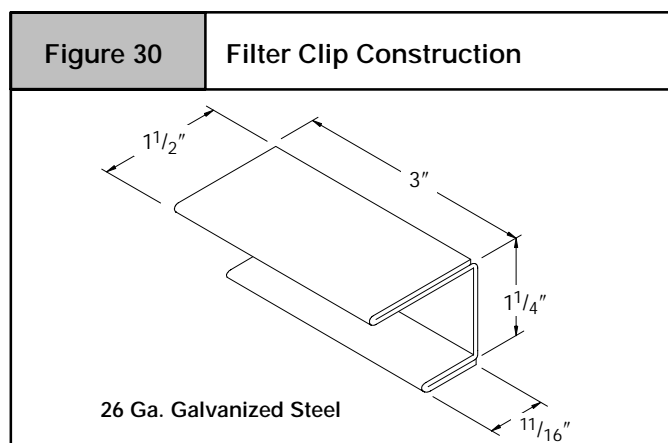
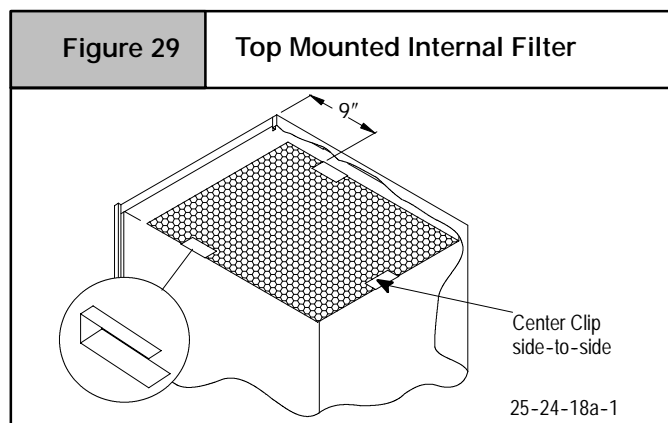
**Disposable, low-velocity filters may be used to replace washable, high-velocity filters, providing they are sized for 300 FPM or less.**

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

## 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 29**. Clips may be obtained from your distributor or fabricated from sheet metal (**Figure 30**). 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 on the heat exchanger. 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.

## 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 safety warnings exactly could result in serious 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 LP Gas Conversion Kit instruction manual for furnaces converted to LP gas)

### Manifold Gas Pressure Adjustments

(Hi & Lo Fire)

**NOTE:** Make adjustment to manifold pressure with burners operating.



## WARNING

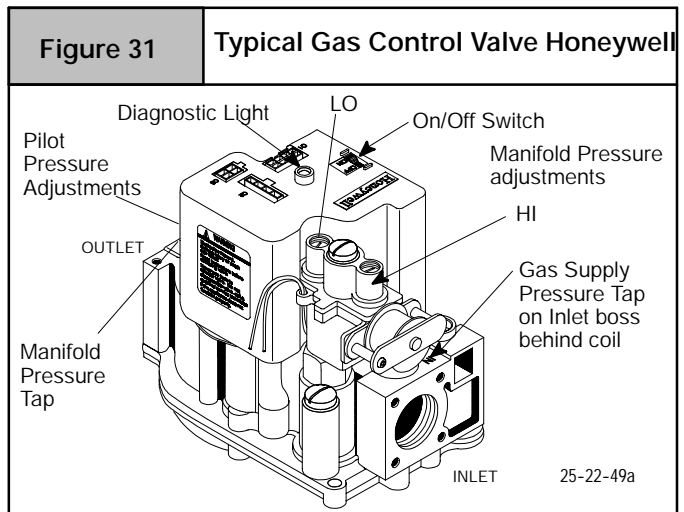
**FIRE OR EXPLOSION HAZARD.**

Failure to turn OFF gas at shut off before connecting manometer could result in death and/or personal injury.

Turn OFF gas at shut off before connecting manometer.

1. With gas **OFF**, connect manometer to manifold pressure tap on the outlet of gas control valve. See **Figure 31**. Use a manometer with a 0" to 12" water column range.
2. Turn gas **ON**. Operate the furnace on high fire by using a jumper wire on the R to W1 & W2 thermostat connections on the fan board.
3. Remove manifold pressure adjustment screw cover on furnace gas control valve. Turn adjusting screw counterclockwise to decrease the manifold pressure and clockwise to increase pressure. See **Figure 31**.

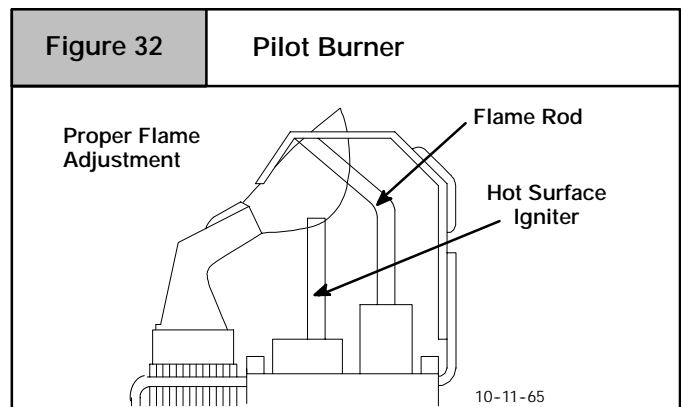
**NOTE:** Adjustment screw cover **MUST** be replaced on gas control valve before reading manifold pressure and operating furnace.



4. Set manifold pressure to value shown in **Table 7** or **Table 8**.
5. Operate the furnace on low fire by using a jumper wire on the R to W1 thermostat connections on the fan board.  
**Note:** The fourth (4th) DIP switch should be in the on position to set the low fire manifold pressure. (See wiring diagram.)
6. Repeat steps 3 and 4 for low fire operation.
7. When the manifold pressures are properly set, replace the adjustment screw covers on the gas control valve.
8. Remove the jumper wires from the thermostat connections on the fan board. Remove manometer connection from manifold pressure tap, and replace plug in manifold.
9. Return fourth (4th) DIP switch to previous setting.
10. Check for leaks at plug.

### Adjust Pilot Burner

The furnace has a pilot flame to light the main burner. The flame should surround  $\frac{3}{8}$ " to  $\frac{1}{2}$ " of the flame rod. See **Figure 32**. To adjust, remove cap from pilot adjusting screw on gas control valve. Turn screw counterclockwise to increase or clockwise to decrease flame as required. Replace cap after adjusting screw.



### 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 W1 and W2 for Hi fire.

- 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.
- Repeat step 2 with jumper wire on **R** to **W1** for low fire.  
**NOTE:** Fourth (4th) DIP switch must be in on position. (See furnace wiring diagram). Return fourth (4th) DIP switch to previous setting after check.

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

Example			
Natural Gas BTU Content	No. of Seconds Per Hour	Time Per Cubic Foot in Seconds	BTU Per Hour
1,000	3,600	48	75,000
$1,000 \times 3,600 \div 48 = 75,000 \text{ BTUH}$			

- Remove jumper wire from R to W1 and W2.
- Relight all appliances and ensure all pilots are operating.

## Orifice Sizing

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

Ensure furnace is equipped with the correct main burner orifices. Refer to **Table 7** or **Table 8** for correct orifice size and manifold pressure for a given heating value and specific gravity for natural and propane gas.

## Operation Above 2000' Altitude

**⚠ WARNING**

**FIRE, EXPLOSION, CARBON MONOXIDE POISONING HAZARD.**

Failure to follow safety warnings exactly could result in serious 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 furnaces may be used at full input rating when installed at altitudes up to 2000'. When installed above 2000', the high fire input must be decreased 2% (natural) or 4% (LP) 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 7** & **Table 8** 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 vertical 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)**

Elevation	High Altitude Multiplier	
	Natural Gas	LP Gas
2001' - 3000'	0.95	0.90
3001' - 4000'	0.93	0.86
4001' - 5000'	0.91	0.82
5001' - 6000'	0.89	0.78
6001' - 7000'	0.87	0.74
7001' - 8000'	0.85	0.70

\* Based on mid-range of elevation.

# MANIFOLD PRESSURE AND ORIFICE SIZE FOR HIGH ALTITUDE APPLICATIONS

Table 7	NATURAL GAS MANIFOLD PRESSURE (" w.c.)																				
	MEAN ELEVATION FEET ABOVE SEA LEVEL																				
	0 to 2000			2001 to 3000			3001 to 4000			4001 to 5000			5001 to 6000			6001 to 7000			7001 to 8000		
HEATING VALUE at ALTITUDE BTU/CU. FT.	Orifice No.	Mnfl'd Pressure		Orifice No.	Mnfl'd Pressure		Orifice No.	Mnfl'd Pressure		Orifice No.	Mnfl'd Pressure		Orifice No.	Mnfl'd Pressure		Orifice No.	Mnfl'd Pressure		Orifice No.	Mnfl'd Pressure	
		Hi	Lo		Hi	Lo		Hi	Lo		Hi	Lo		Hi	Lo		Hi	Lo		Hi	Lo
700	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	41	3.7	1.8
725	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	41	3.7	1.8	41	3.4	1.7
750	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	41	3.5	1.7	42	3.6	1.7
775	--	--	--	--	--	--	--	--	--	--	--	--	41	3.6	1.7	42	3.6	1.8	42	3.3	1.6
800	--	--	--	--	--	--	--	--	--	41	3.6	1.8	42	3.7	1.8	42	3.4	1.7	42	3.1	1.5
825	--	--	--	--	--	--	41	3.7	1.8	41	3.4	1.7	42	3.5	1.7	42	3.2	1.6	42	2.9	1.4
850	--	--	--	--	--	--	41	3.5	1.7	42	3.6	1.7	42	3.3	1.6	42	3.0	1.5	42	2.8	1.4
875	--	--	--	41	3.6	1.7	42	3.6	1.8	42	3.4	1.6	42	3.1	1.5	42	2.8	1.4	42	2.6	1.3
900	--	--	--	42	3.7	1.8	42	3.4	1.7	42	3.2	1.6	42	2.9	1.4	42	2.7	1.3	42	2.5	1.2
925	41	3.7	1.8	42	3.5	1.7	42	3.3	1.6	42	3.0	1.5	42	2.8	1.4	42	2.5	1.2	42	2.3	1.1
950	41	3.5	1.7	42	3.3	1.6	42	3.1	1.5	42	2.9	1.4	42	2.6	1.3	42	2.4	1.2	43	2.7	1.3
975	42	3.7	1.8	42	3.2	1.6	42	2.9	1.4	42	2.7	1.3	42	2.5	1.2	42	2.3	1.1	43	2.6	1.3
1000	42	3.5	1.7	42	3.0	1.5	42	2.8	1.4	42	2.6	1.3	42	2.4	1.2	43	2.7	1.3	43	2.4	1.2
1050	42	3.2	1.6	42	2.7	1.3	42	2.5	1.2	42	2.3	1.1	43	2.6	1.3	--	--	--	--	--	--
1100	42	2.9	1.4	42	2.5	1.2	42	2.3	1.1	43	2.6	1.3	--	--	--	--	--	--	--	--	--

NOTE: Natural gas data is based on 0.60 specific gravity. For fuels with different specific gravity consult the National Fuel Gas Code ANSI Z223.1-2002/NFPA 54-2002 or National Standard of Canada, Natural Gas and Propane Installation Code CSA B149.1-00.

Table 8	LPG or PROPANE GAS MANIFOLD PRESSURE (" w.c.)													
	MEAN ELEVATION FEET ABOVE SEA LEVEL													
	0 to 2000		2001 to 3000		3001 to 3999		4001 to 5000		5001 to 6000		6001 to 7000		7001 to 8000	
	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
2500	10.0	4.9	10.0	4.9	9.0	4.4	10.0	4.9	9.4	4.6	8.5	4.2	10	4.9
Orifice Size	#54		#54		#54		#55		#55		#55		#56	

NOTE: Propane data is based on 1.53 specific gravity. For fuels with different specific gravity consult the National Fuel Gas Code ANSI Z223.1-2002/NFPA 54-2002 or National Standard of Canada, Natural Gas and Propane Installation Code CSA B149.1-00.

NOTE: The derating of these furnaces at 2% (Natural Gas) and 4% (LP Gas) has been tested and design-certified by CSA.

## High Altitude Air Pressure Switch

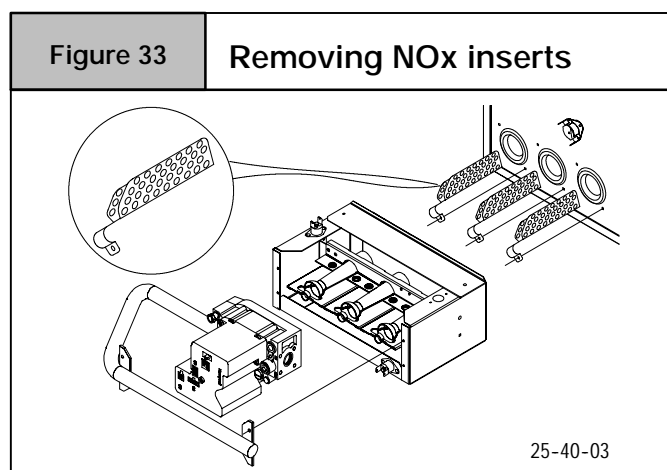
The factory-installed pressure switches need NOT be changed for any furnace installations from sea level up to and including 8,000' altitude.

**⚠ WARNING**

**CARBON MONOXIDE POISONING HAZARD.**

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

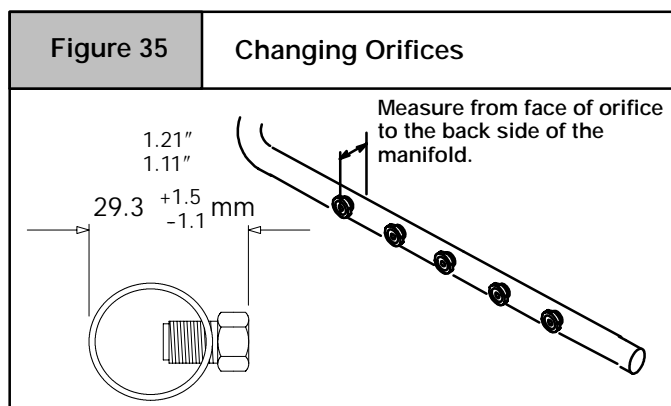
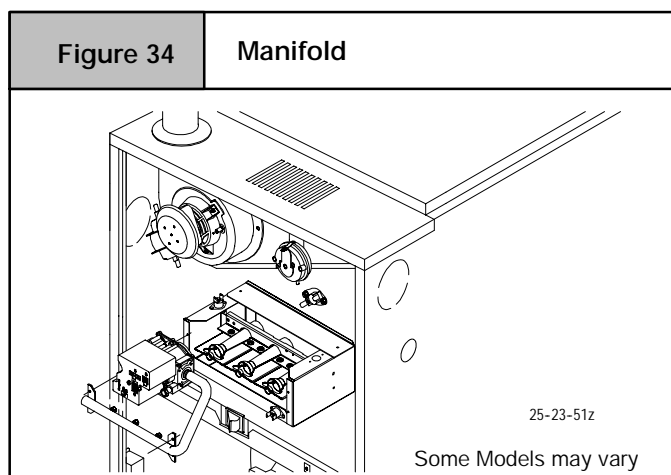
NOx inserts for use with Natural Gas units ONLY. If LP Gas is required, NOx inserts must be removed.



## 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 and pilot tubing 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.

- Remove the four (4) screws holding the manifold and gas valve to the manifold supports. Do not discard any screws. See **(Figure 34)**.
- Carefully remove the manifold assembly.
- Remove the orifices from the manifold and replace them with proper sized orifices. See **Figure 35**.
- Tighten orifices so they are seated and gas tight. See **Figure 35**.
- Reassemble all parts in reverse order as removed. Be sure to engage the main burner orifices in the proper openings in the burners.
- After reassembling, turn gas on and check all joints for gas leaks using a soapy solution. All leaks must be repaired immediately.



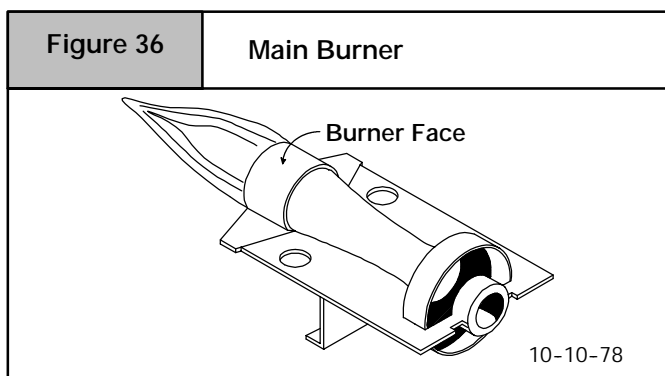
## Main Burner Flame Check

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

Check for the following (**Figure 36**):

- 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.



## Temperature Rise Check

**CAUTION**

**REDUCED FURNACE LIFE HAZARD**

Failure to properly set the air temperature rise may result in reduced furnace life.

Use **ONLY** the blower motor speed taps marked "Y" for YES for setting air temperature rise.

Blower Motor Speed Taps for \*8MPT Model Sizes

Model Sizes	Heat Stage	LO RED	M LO BLUE	M HI ORN	HI BLK
050B12	LO HI	N N	Y Y	Y Y	Y N
075B14	LO HI	N N	Y Y	Y Y	Y Y
100F14	LO HI	N N	Y N	Y Y	Y Y
100J20	LO HI	Y N	Y N	N Y	N Y
125J20	LO HI	N N	N N	Y Y	Y Y

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:

- Place thermometers in supply and return air registers as close to furnace as possible, avoiding direct radiant heat from heat exchangers.
- Operate furnace on high fire for 10 minutes with all the registers and duct dampers open by using a jumper wire on R to W1 and W2 thermostat connections on the fan board.  
**Note:** The fourth (4th) DIP Switch should be in the on position. (See furnace wiring diagram)
- Take readings and compare with range specified on rating plate.
- 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.
- Repeat steps 2 thru 4 with the furnace operating on low fire for 10 minutes by using a jumper wire on the R to W1 thermostat connections on the fan board.
- Remove the jumper wire after the adjustments are complete. Return fourth (4th) to previous setting.

## Changing Blower Speed on \*8MPT



### WARNING

#### ELECTRICAL SHOCK HAZARD.

Failure to disconnect power could result in death, personal injury and/or property damage.

Turn OFF power to furnace 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 for 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 blower motor speed 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 fan control as well as location of unused blower motor speed leads. Use the chart (**Table 9**) to determine the blower motor speed settings.

Table 9	Blower Speed Chart (*8MPT)
Wire Color	Motor Speed
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 lead from the "Heat" or "Cool" terminal and replace it with the desired motor speed lead from the "Unused Motor Lead" location. Connect the wire previously removed from the "Heat" or "Cool" terminal to the vacated "Unused Motor Lead" 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 "Unused Motor Lead" 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 "Unused Motor Lead" 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

A terminal is provided on the electronic fan control 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.

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 electronic fan control. 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 low heating speed and continuous-fan speed using the same blower speed, connect a jumper between the "Low-Heat" and "Cont" terminals on the electronic fan control.

**Note:** There should be only ONE motor lead going to the "Low-Heat" and "Cont" terminals.

## Changing Blower Speed on \*8MPV



### WARNING

#### ELECTRICAL SHOCK HAZARD.

Failure to disconnect power could result in death, personal injury and/or property damage.

Turn OFF power to furnace before changing speed taps.

**Note:** The blower speeds that the manufacturer sets from the factory for this product are based on a nominal 400 CFM per ton cooling and the 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 blower speeds for the application when the furnace is installed.

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

1. The 115 VAC power supply to the furnace must be turned OFF before making adjustments to the motor.

**NOTE:** Allow at least 1 minute before restoring power to the furnace after making Blower Control changes.

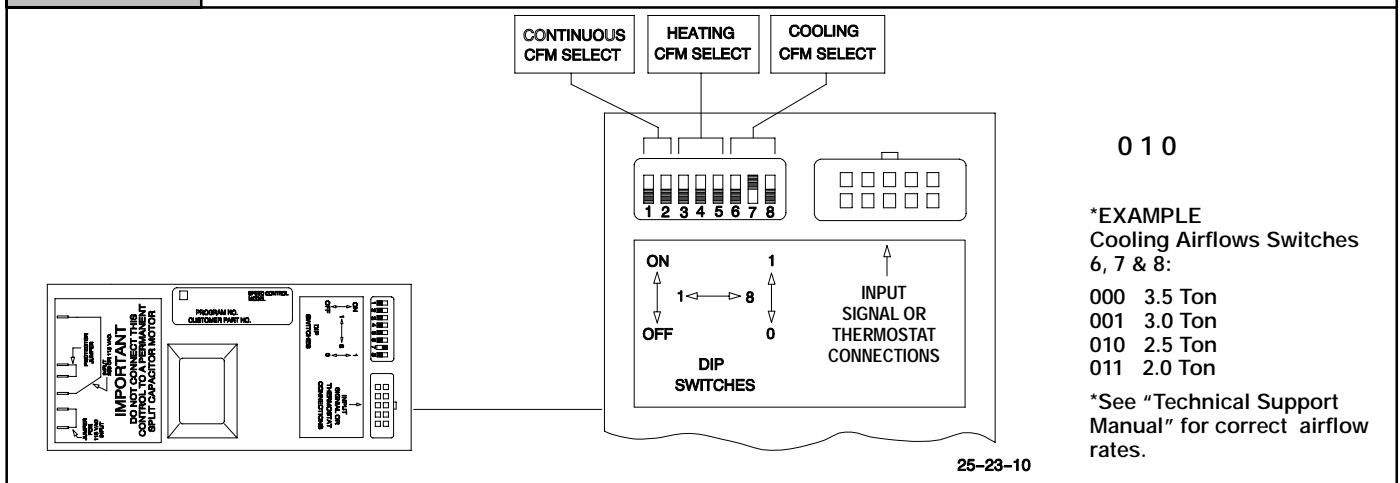
2. The heating, cooling and continuous blower speeds can be adjusted by changing the switch settings that are located on the motor control (see **Figure 37**). Switches #1 and #2 adjust the continuous blower speeds. Switches #3, #4 and #5 adjust the heating speeds. Switches #6, #7 and #8 adjust the cooling speed. See the "Technical Support Manual" for the switch settings for the desired airflow rates for the installation.

**NOTE:** If resonance occurs during steady-state operation, change to a different, yet similar, DIP switch setting or adjust the static pressure to eliminate the noise.



Figure 37

## Variable Speed Blower Motor Control (\*8MPV)



## 13. Furnace Maintenance

**WARNING****FIRE, EXPLOSION, OR CARBON MONOXIDE POISONING HAZARDS**

Failure to have the furnace inspected and maintained could result in death, personal injury 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 safety warnings exactly could result in dangerous operation, serious injury, death or property damage.

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

- Before servicing, disconnect all electrical power to furnace.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
- Verify proper operation after servicing.

## 14. Sequence of Operation & Diagnostics for \*8MPV

---

The following is the normal operating sequence.

### Cooling (Y) Request:

24 VAC signals applied to Y & G terminals of EFT (electronic fan timer) control.

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

Y & G signals removed from EFT.

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

Cooling (Y) and dehumidification (Y2) requests:

- 24 VAC signals applied to Y, Y2 & G terminals of EFT (electronic fan timer) control.
- Same operation as the cooling (Y) request, except the cooling speed is reduced 20% to compensate for high humidity conditions during cooling operation. The cooling speed returns to the normal setting after the Y2 signal is removed.

### Continuous Circulating Fan (G) Request:

24 VAC signals applied to G terminals of EFT control.

- Low motor speed is energized without delay.

G signal removed from EFT.

- Low motor speed is de-energized without delay.

NOTE1) Blower motor runs at low circulating fan speed in response to G request.

NOTE2) 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.

### Heating (W1) Request (single stage thermostat operation, 4th DIP switch on fan timer must be in off position) (see furnace wiring diagram):

24 VAC signals applied to W1 terminal of EFT control.

- Inducer motor turns on at high speed.
- The main and high fire solenoids are energized.
- Following a 3 second prepurge delay, the pilot valve opens and the ignitor begins to warm up.
- After the pilot lights, the main burners light at high fire rate.
- Timed from the opening of the main gas control valve, the furnace control will delay blower operation for the Heat Fan On Delay time before switching the inducer to low speed, de-energizing the high fire solenoid and the fan switches to Low Heat speed.
- Timed from initial application of the Heating request, if the W1 request is still present after the Low Fire Delay time expires (12 minutes), the inducer switches to high speed, the high fire solenoid energizes and the fan switches to High Heat speed.

W1 signal removed from EFT.

- The gas valve de-energizes and the main burners go out.
- The inducer runs at its present speed for a 30 second postpurge period.
- The fan switches to (or stays at) Low Heat speed.
- Timed from the gas valve de-energizing, the circulating fan de-energizes after the selected Heat Fan Delay time expires.

NOTE3) If a new Heating request arrives while the control is waiting in the Heat Fan Off Delay time, the fan speed switches to High Heat until the Heat Fan Off Delay expires or the Heat Fan On Delay expires for the new Heating request.

### Heating Request (two stage thermostat operation, 4th DIP switch must be in on position) (see furnace wiring diagram):

24 VAC signals applied to W1 terminal of EFT control.

- Same response as single stage thermostat operation described above except the control will not go to high fire, High Heat fan speed unless a W2 signal is applied.

24 VAC signals applied to W1 and W2 terminals of EFT control.

- Same light-off routine as described for the single stage thermostat operation except that at the end of the Heat Fan On Delay, the inducer remains on high fire, the high fire solenoid remains energized and the High Heat fan speed energizes.

NOTE4) The EFT control responds without delay to the presence or loss of W2 (with W1 constant). W1 & W2 result in high inducer, high fire, and High Heat fan speed. W1 only results in low inducer, low fire, and Low Heat fan speed.

## Heating Request with Gas Shut Off:

24 VAC signals applied to W1 terminal of EFT control.

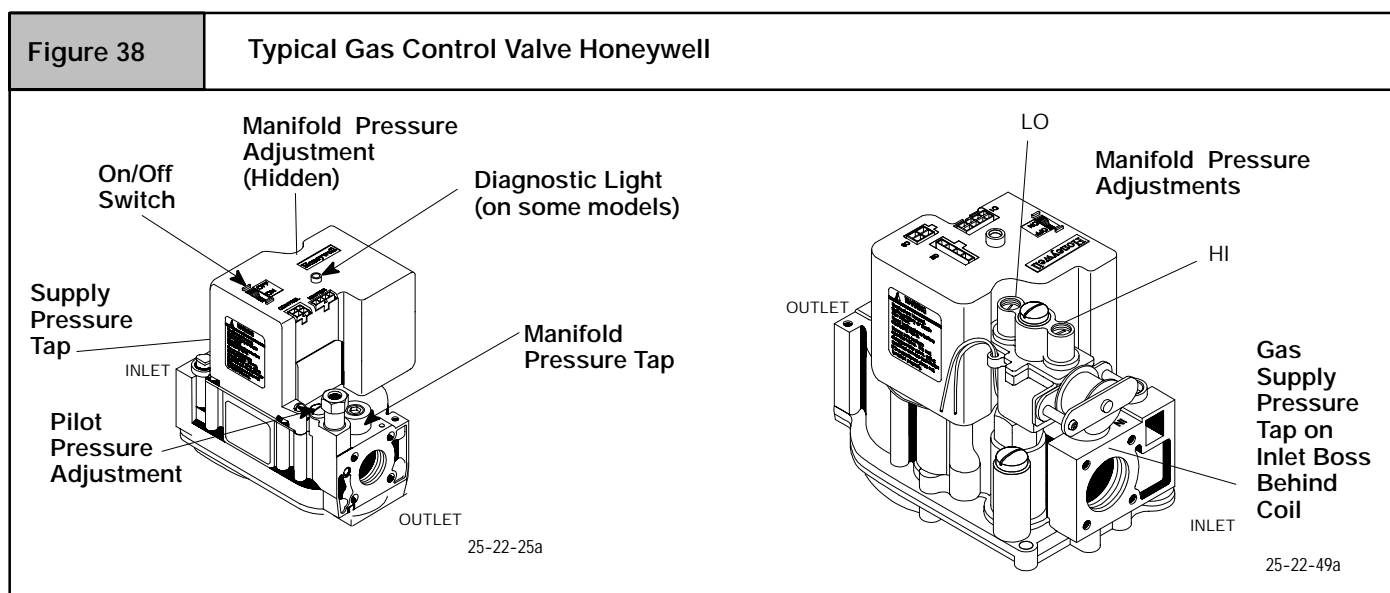
- Inducer motor turns on at high speed.
- The main and high fire solenoids are energized.
- Following a 3 second prepurge delay, the pilot valve opens and the igniter begins to warm up.
- The igniter glows red-hot for 30 seconds, then turns off.
- The igniter stays off for 25 seconds, then begins to warm-up again.
- The igniter glows red-hot for 30 seconds, then turns off.
- The pilot valve closes 3 seconds after the igniter de-energizes.
- The inducer de-energizes 30 seconds after the pilot valve closes.
- The SmartValve proceeds to soft lockout and flashes error code 6.
- The control exits soft lockout after 5 minutes and begins another ignition sequence.

## Gas Control Valve Diagnostic Codes (See Figure 38)

OFF	= Control not powered
Heartbeat	= Normal Operation (Standby or call for heat)
1 Flash	= Not used
2 Flashes	= Low Pressure switch closed when should be open
3 Flashes	= Low Pressure switch circuit was still sensed as open 30 seconds after the inducer was energized. System is in 5 minute delay mode, with inducer off. After 5-minute delay, a new ignition sequence will be initiated. (Note: SV9541Q On/Off switch in off position during a call for heat will generate this diagnostic code)
4 Flashes	= Limit switch string open
5 Flashes	= Flame sensed out of sequence - Flame signal still present.
6 Flashes + 1 Note 1	= Soft Lockout -Maximum retry count exceeded (failed to light within 4 trials for ignition)
6 Flashes + 2 Notes 1,2	= Soft Lockout -Maximum recycle count exceeded - Last failure was Flame Sense Lost During Run, Cycling Pressure Switch or Blocked Condensate.
6 Flashes + 3 Notes 1,2	= Soft Lockout -Maximum recycle count exceeded - Last failure was Airflow Proving Circuit Opened During Run
6 Flashes + 4 Notes 1,2	= Soft Lockout -Maximum recycle count exceeded - Last failure was Limit Circuit Opened During Run
7 Flashes	= Soft Lockout Due to Limit Trips Taking Longer than 2 minutes to Reset; Auto Reset After 1 Hour if Call for Heat Still Present. Reset by Cycling Call for Heat at Any Time.
8 Flashes	= High Pressure Switch closed when should be open or Low Pressure Switch open during run or Limit Switch opened during run.
9 Flashes	= High Pressure Switch open when should be closed.

NOTE 1: The 6 + X designation indicates a combination of flash codes: 6 flashes shows the control is in soft lockout, followed by X flashes to indicate the reason the control went into soft lockout. When the 6+ X code is flashing, the SV9541 will attempt a new ignition sequence after a five minute delay period, if the call for heat is still present. Reset of the thermostat will initiate a new ignition sequence immediately.

NOTE 2: Any combination of 5 'abnormal' events during a single call for heat will result in soft lockout. An 'abnormal' event is a Flame Sense Failure During Run, Airflow Proving Circuit Open During Run, or Limit Circuit Open During Run. The flash code will indicate which was the last 'abnormal' event that put the system into the soft lockout state based on the table above.



## 15. Sequence of Operation & Diagnostics for \*8MPT

---

The following is the normal operating sequence.

### Cooling (Y) Request:

24 VAC signals applied to Y & G terminals of EFT (electronic fan timer) control.

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

Y & G signals removed from EFT.

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

### Continuous Circulating Fan (G) Request:

24 VAC signals applied to G terminals of EFT control.

- Low-Heat motor speed is energized without delay.

G signal removed from EFT.

- Low-Heat motor speed is de-energized without delay.

NOTE1) 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 EFT, in **which** case see NOTE 2).

NOTE2) 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.

### Heating (W1) Request (single stage thermostat operation, 4th DIP switch on fan timer must be in off position) (see furnace wiring diagram):

24 VAC signals applied to W1 terminal of EFT control.

- Inducer motor turns on at high speed.
- The main and high fire solenoids are energized.
- Following a 3 second prepurge delay, the pilot valve opens and the ignitor begins to warm up.
- After the pilot lights, the main burners light at high fire rate.
- Timed from the opening of the main gas control valve, the furnace control will delay blower operation for the Heat Fan On Delay time before switching the inducer to low speed, de-energizing the high fire solenoid, and the fan switches to Low Heat speed.
- Timed from initial application of the Heating request, if the W1 request is still present after the Low Fire Delay time expires (12 minutes), the inducer switches to high speed, the high fire solenoid energizes, and the fan switches to High Heat speed.

W1 signal removed from EFT.

- The gas valve de-energizes and the main burners go out.
- The inducer runs at its present speed for a 30 second postpurge period.
- The fan switches to (or stays at) Low Heat speed.
- Timed from the gas valve de-energizing, the circulating fan de-energizes after the selected Heat Fan Delay time expires.

NOTE3) If a new Heating request arrives while the control is waiting in the Heat Fan Off Delay time, the fan speed switches to High Heat until the Heat Fan Off Delay expires or the Heat Fan On Delay expires for the new Heating request.

### Heating Request (two stage thermostat operation, 4th DIP switch must be in on position) (see furnace wiring diagram):

24 VAC signals applied to W1 terminal of EFT control.

- Same response as single stage thermostat operation described above except the control will not go to high fire, High Heat fan speed unless a W2 signal is applied.

24 VAC signals applied to W1 and W2 terminals of EFT control.

- Same light-off routine as described for the single stage thermostat operation except that at the end of the Heat Fan On Delay, the inducer remains on high fire, the high fire solenoid remains energized and the High Heat fan speed energizes.

NOTE4) The EFT control responds without delay to the presence or loss of W2 (with W1 constant). W1 & W2 result in high inducer, high fire, and High Heat fan speed. W1 only results in low inducer, low fire, and Low Heat fan speed.

## Heating Request with Gas Shut Off:

24 VAC signals applied to W1 terminal of EFT control.

- Inducer motor turns on at high speed.
- The main and high fire solenoids are energized.
- Following a 3 second prepurge delay, the pilot valve opens and the igniter begins to warm up.
- The igniter glows red-hot for 30 seconds, then turns off.
- The igniter stays off for 25 seconds, then begins to warm-up again.
- The igniter glows red-hot for 30 seconds, then turns off.
- The pilot valve closes 3 seconds after the igniter de-energizes.
- The inducer de-energizes 30 seconds after the pilot valve closes.
- The SmartValve proceeds to soft lockout and flashes error code 6.
- The control exits soft lockout after 5 minutes and begins another ignition sequence.

## Gas Control Valve Diagnostic Codes (See Figure 38)

OFF	= Control not powered
Heartbeat	= Normal Operation (Standby or call for heat)
1 Flash	= Not used
2 Flashes	= Low Pressure switch closed when should be open
3 Flashes	= Low Pressure switch circuit was still sensed as open 30 seconds after the inducer was energized. System is in 5 minute delay mode, with inducer off. After 5-minute delay, a new ignition sequence will be initiated. (Note: SV9541Q On/Off switch in off position during a call for heat will generate this diagnostic code)
4 Flashes	= Limit switch string open
5 Flashes	= Flame sensed out of sequence - Flame signal still present.
6 Flashes + 1 Note 1	= Soft Lockout -Maximum retry count exceeded (failed to light within 4 trials for ignition)
6 Flashes + 2 Notes 1,2	= Soft Lockout -Maximum recycle count exceeded - Last failure was Flame Sense Lost During Run, Cycling Pressure Switch or Blocked Condensate.
6 Flashes + 3 Notes 1,2	= Soft Lockout -Maximum recycle count exceeded - Last failure was Airflow Proving Circuit Opened During Run
6 Flashes + 4 Notes 1,2	= Soft Lockout -Maximum recycle count exceeded - Last failure was Limit Circuit Opened During Run
7 Flashes	= Soft Lockout Due to Limit Trips Taking Longer than 2 minutes to Reset; Auto Reset After 1 Hour if Call for Heat Still Present. Reset by Cycling Call for Heat at Any Time.
8 Flashes	= High Pressure Switch closed when should be open or Low Pressure Switch open during run or Limit Switch opened during run.
9 Flashes	= High Pressure Switch open when should be closed.

NOTE 1: The 6 + X designation indicates a combination of flash codes: 6 flashes shows the control is in soft lockout, followed by X flashes to indicate the reason the control went into soft lockout. When the 6+ X code is flashing, the SV9541 will attempt a new ignition sequence after a five minute delay period, if the call for heat is still present. Reset of the thermostat will initiate a new ignition sequence immediately.

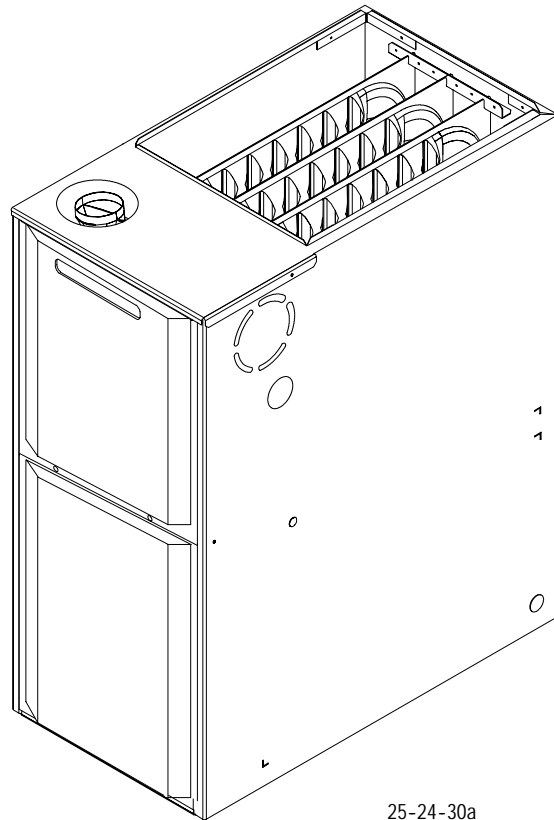
NOTE 2: Any combination of 5 'abnormal' events during a single call for heat will result in soft lockout. An 'abnormal' event is a Flame Sense Failure During Run, Airflow Proving Circuit Open During Run, or Limit Circuit Open During Run. The flash code will indicate which was the last 'abnormal' event that put the system into the soft lockout state based on the table above.



# Technical Support Manual

## Upflow Models

- \*8MPV050B12A1
- \*8MPV075F14A1
- \*8MPV100J20A1
- \*8MPV125J20A1
- \*8MPT050B12A1
- \*8MPT075F14A1
- \*8MPT100F14A1
- \*8MPT100J20A1
- \*8MPT125J20A1



# FAN ASSISTED COMBUSTION GAS FURNACES



Manufactured by:  
*International Comfort Products, LLC*  
Lewisburg, TN 37091  
Fast Parts Division  
(866) 380-3278



**Save This Manual For Future Reference**

Manufacturers Number (Mfr No -See Rating Plate) ALL Models								
Specifications								
	*8MPV050B12A		*8MPV075F14A		*8MPV100J20A		*8MPV125J20A	
<b>General</b>								
Gas Type	Nat	LP	Nat	LP	Nat	LP	Nat	LP
Transformer Size (VA)	40	40	40	40	40	40	40	40
T'stat Heat Anticipator	.10	.10	.10	.10	.10	.10	.10	.10
Input (Btuh) Std/Alt. Hi Fire	50,000		75,000		100,000		125,000	
Lo Fire	35,000		52,500		70,000		87,500	
Output (Btuh) Std/Alt. Hi Fire	40,000		60,000		81,000		101,000	
Lo Fire	28,000		42,000		61,000		71,000	
Temp. Rise (°F) Hi Fire	30-60		30-60		35-65		30-60	
Lo Fire	25-55		25-55		35-65		25-55	
Electrical (Volts/Hz)	115/60		115/60		115/60		115/60	
Rating Plate Amps.	8.6		7.9		12.8		13.8	
<b>Gas &amp; Ignition</b>								
Gas Type	Nat	LP	Nat	LP	Nat	LP	Nat	LP
Std. Main Orifices (No/Size)	2/#42	2/#54	3/#42	3/#54	4/#42	4/#54	5/#42	5/#54
Gas Valve (Honeywell)	SV 9541	SV 9541	SV 9541	SV 9541	SV 9541	SV 9541	SV 9541	SV 9541
Regulation Type	SNAP	SNAP	SNAP	SNAP	SNAP	SNAP	SNAP	SNAP
Manifold Press. Hi Fire (" WC)	3.5	10.0	3.5	10.0	3.5	10.0	3.5	10.0
Lo Fire (" WC)	1.7	4.9	1.7	4.9	1.7	4.9	1.7	4.9
Pilot Orifice Size	.018	.011	.018	.011	.018	.011	.018	.011
Ignition Type/Series	HW HSP	HW HSP	HW HSP	HW HSP	HW HSP	HW HSP	HW HSP	HW HSP
<b>Combustion</b>								
Flue Outlet Size (Inches)	4	4	4	4	4	4	4	4
<b>Limits &amp; Controls</b>								
Fan Control (Type)	HW ST9162		HW ST9162		HW ST9162		HW ST9162	
Fan Control On delay	30		30		30		30	
(Timed-secs) Off delay	60,100,140,180		60,100,140,180		60,100,140,180		60,100,140,180	
Thermal Sensor (°F)	300		300		300		300	
Limit Control Setting (°F)	See Limit in Parts List		See Limit in Parts List		See Limit in Parts List		See Limit in Parts List	
Std. Pressure Sw. (Part #)	1013862		1013862		1013862		1013862	
Hi Fire Press (Close)	-0.69		-0.69		-0.69		-0.69	
Hi Fire Press (Open)	-0.59		-0.59		-0.59		-0.59	
Lo Fire Press (Close)	-0.40		-0.40		-0.40		-0.40	
Lo Fire Press (Open)	-0.30		-0.30		-0.30		-0.30	
<b>Blower Data</b>								
Type & Size	11-8		11-10		11-10		11-10	
Motor Amps/Rpm	4.6/1050		12/900		12/900		12/900	
Motor Type/H.p.	DC/1½		DC/1		DC/1		DC/1	
Filter Type	Washable		Washable		Washable		Washable	
Filter Size (")	14x25x1½		16x25x1½		16x25x1½ (2)		16x25x1½ (2)	
Min. Cool Cap. (Tons)	1.5		1.5		3		3	
Max. Cool Cap. (Tons)	3		3.5		5		5	
<b>Gas Conversion Kits</b>								
Nat to LP	*1011789		*1011789		*1011789		*1011789	
LP to Nat	*1011787		*1011787		*1011787		*1011787	

\*Must be ordered from Service Parts  
Use the Fuel Gas Code to establish proper vent sizing.



# Circulation Air Blower Data - \*8MPV

## Heating, Cooling & Continuous Airflow Settings

Continuous Blower (CFM) @ 0.10" Static

Switch Settings		Furnace Model		
#1	#2	50K	75K	100/125K
0*	0*	542	632	698
0	1	664	771	858
1	0	777	903	1032
1	1	911	1046	1174

\*Factory Setting

Heating Air Temperature Adjustment (° F)\*

Switch Settings			Furnace Model			
#3	#4	#5	50K	75K	100K	125K
0**	0**	0**	0	0	0	0
0	0	1	1	1	3	3
0	1	0	2	2	5	5
0	1	1	3	4	7	8
1	0	0	6	5	8	10
1	0	1	-3	-3	-5	-1
1	1	0	-5	-6	-8	-2
1	1	1	-7	-9	-12	-4

\*Approximate air temperature change from factory setting @ 0.20" static on high heat (low heat speed changes with change of high heat speed on most settings)

\*\*Factory setting

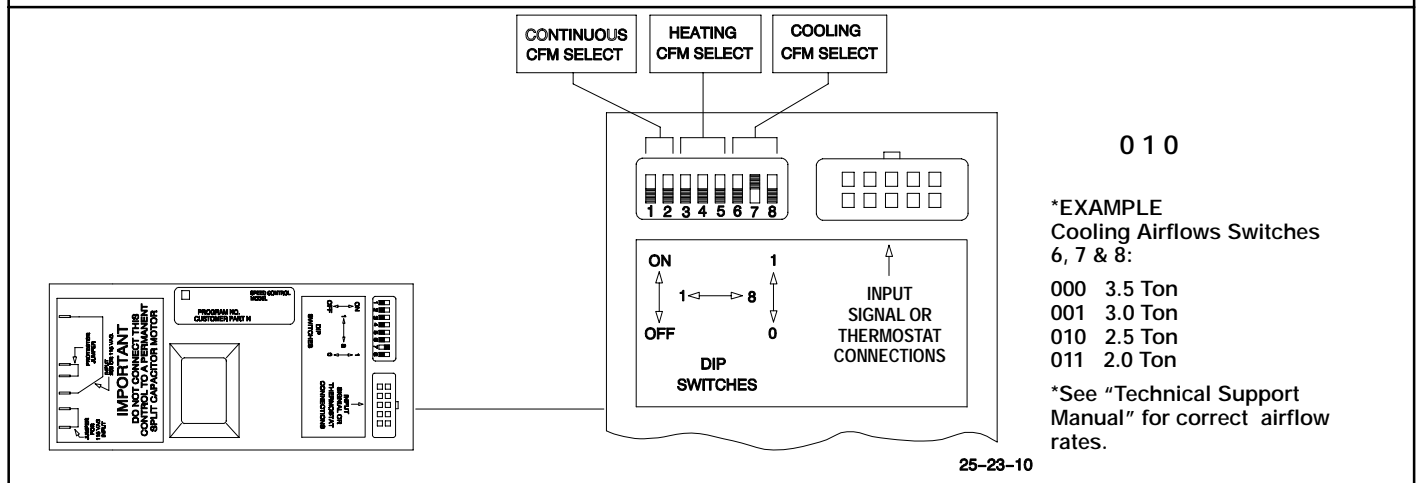
Cooling (CFM) @ 0.50" Static

(See Figure 1 - 3 for complete Airflow Range)

Switch Settings			Furnace Model		
#6	#7	#8	50K	75K	100/125K
0*	0*	0*	1167	1414	2169
0	0	1	1115	1306	2003
0	1	0	1000	1209	1806
0	1	1	907	1105	1601
1	0	0	810	1009	1408
1	0	1	760	907	1204
1	1	0	703	842	1006
1	1	1	656	816	813

\*Factory setting

## Blower Motor Settings



# Circulation Air Blower Data - \*8MPV

## Heating, Cooling & Continuous Airflow Settings

Figure 1

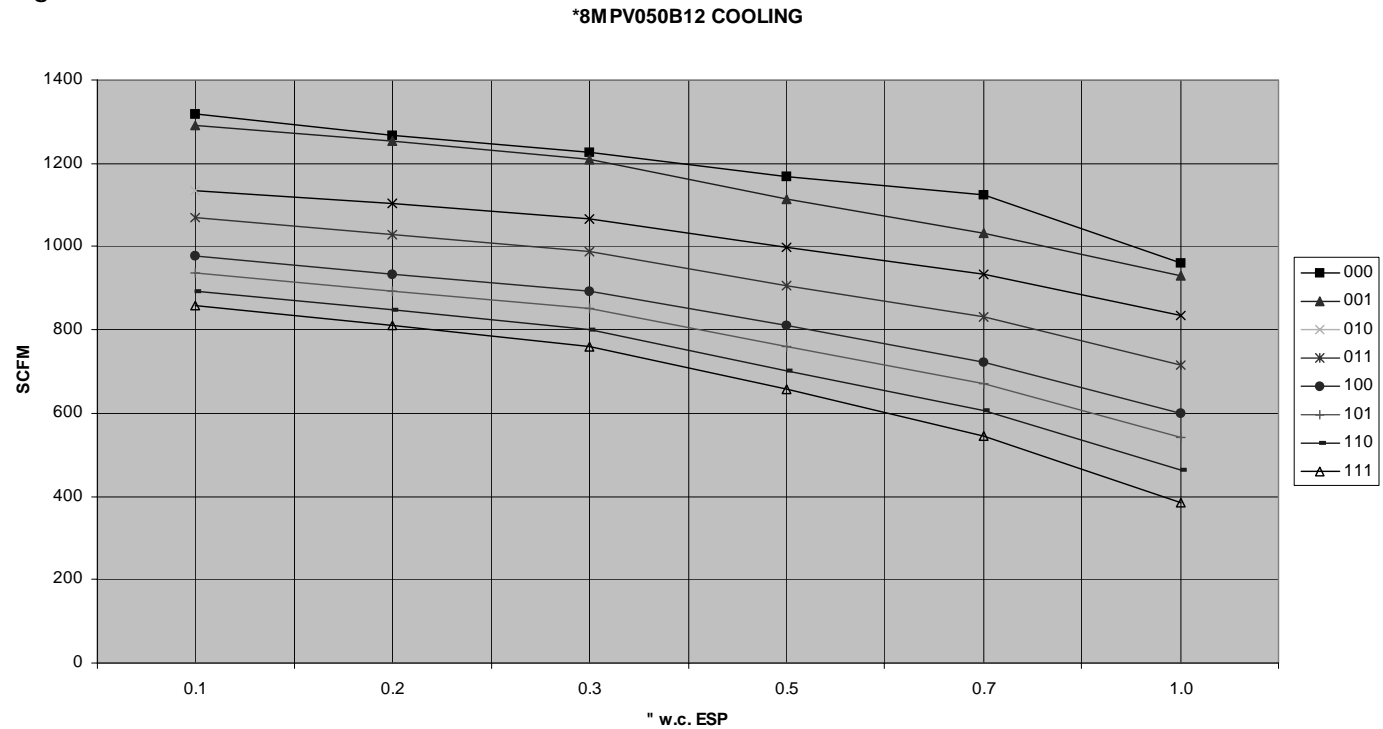
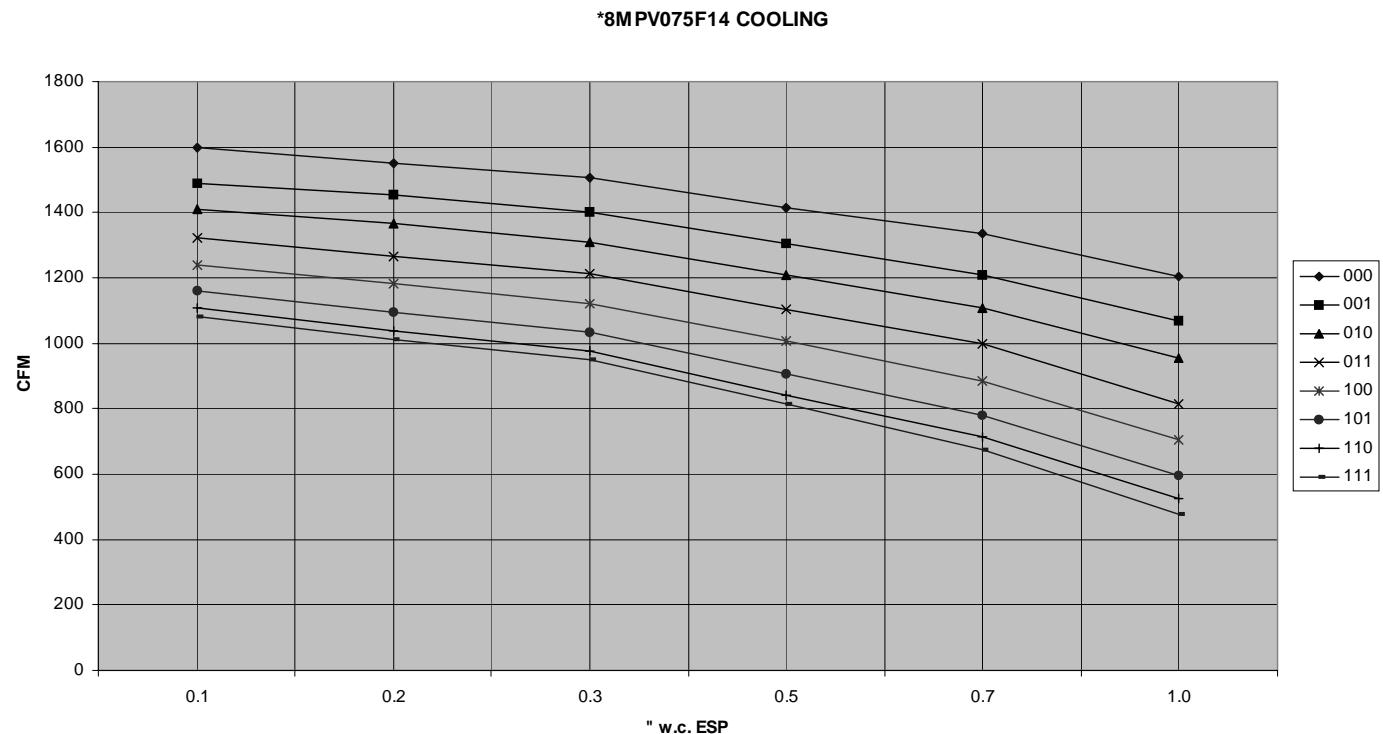


Figure 2



# Circulation Air Blower Data - \*8MPV

## Heating, Cooling & Continuous Airflow Settings

Figure 3

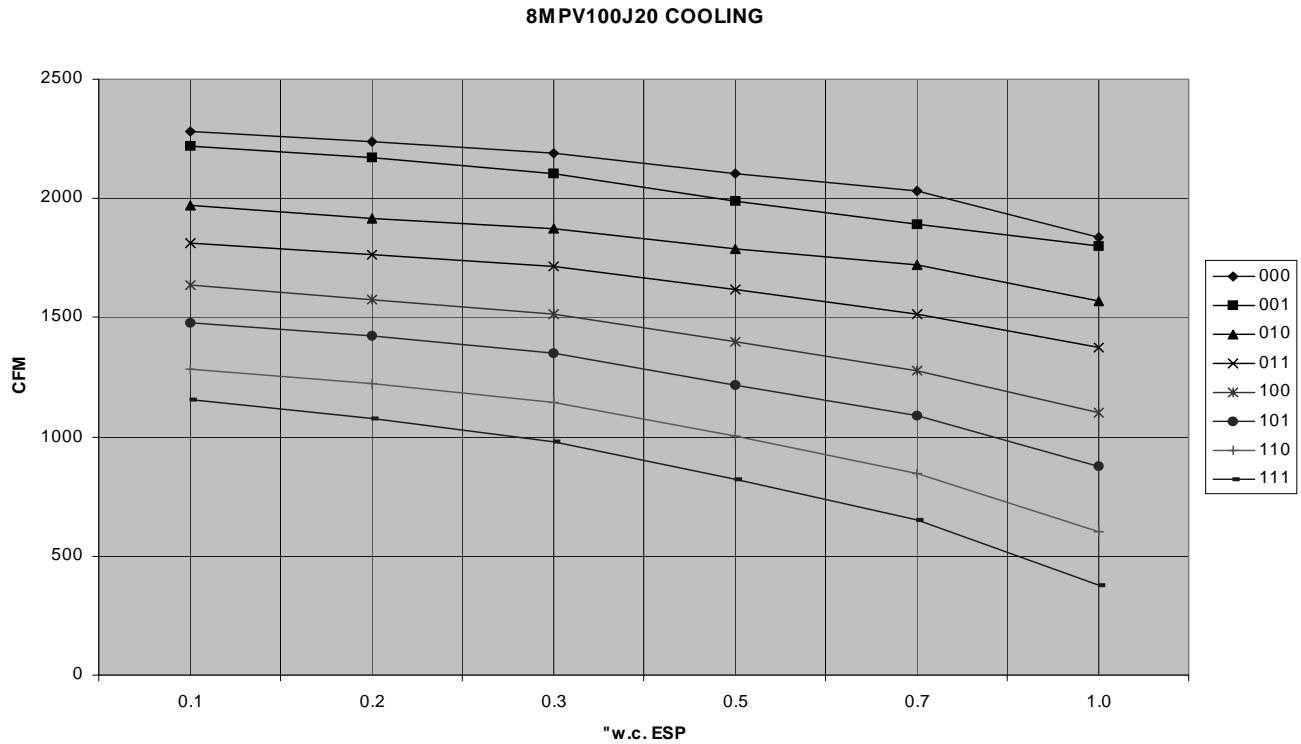
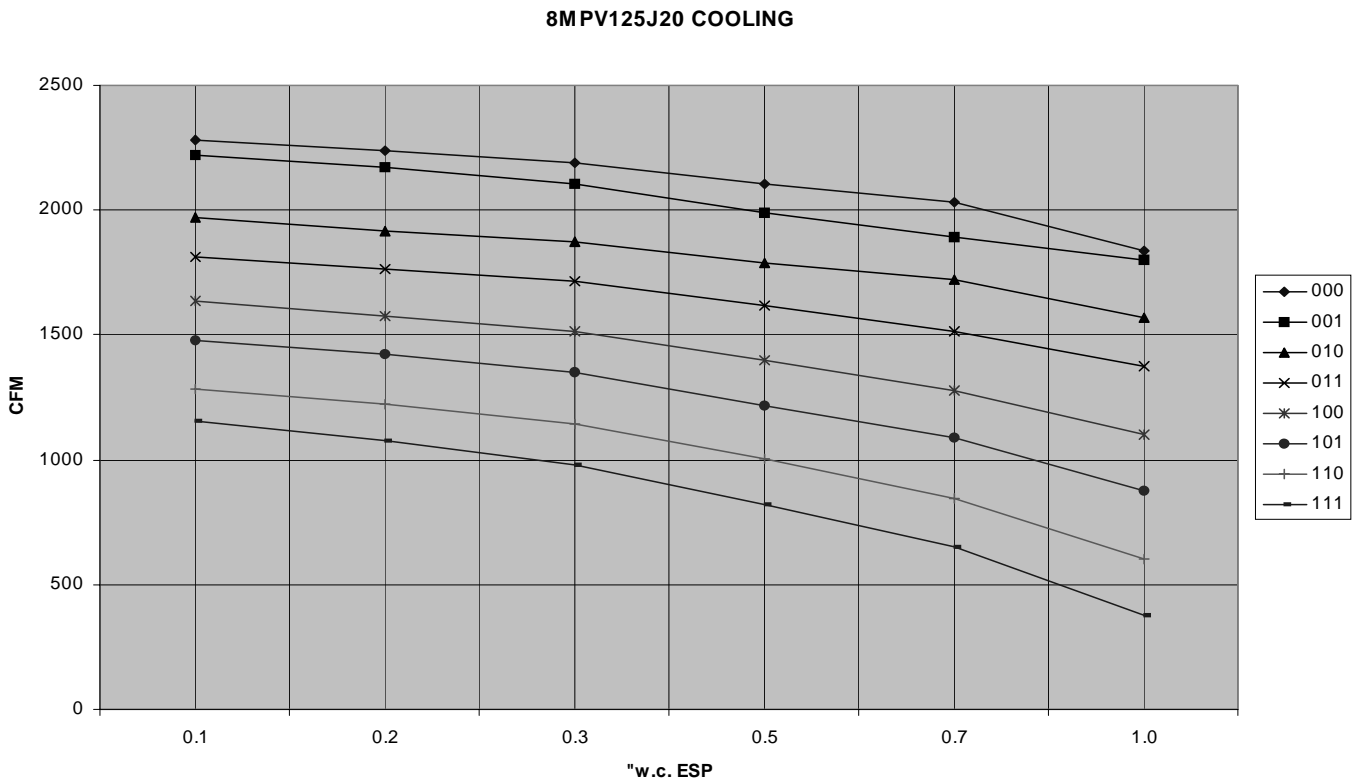
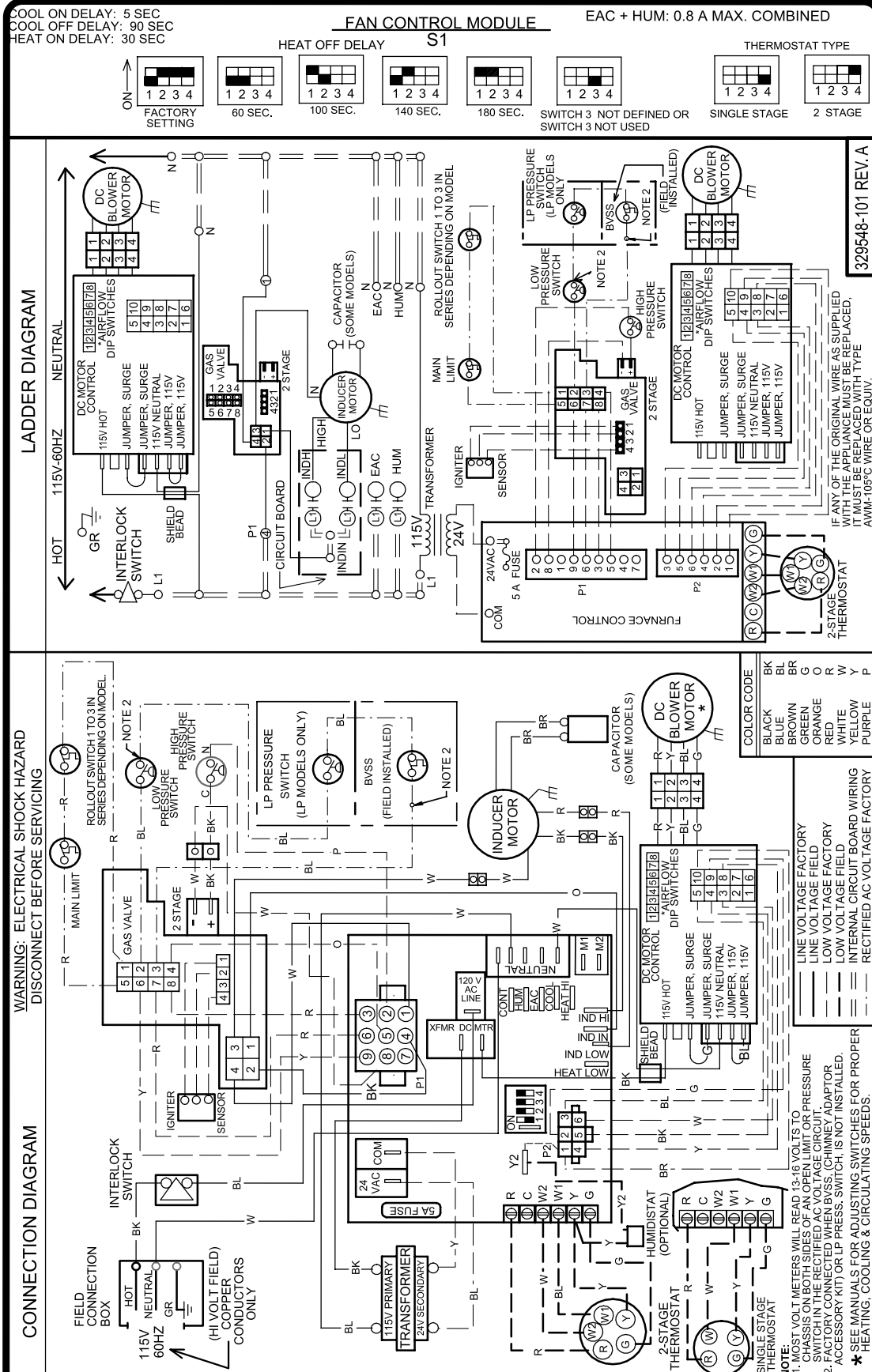


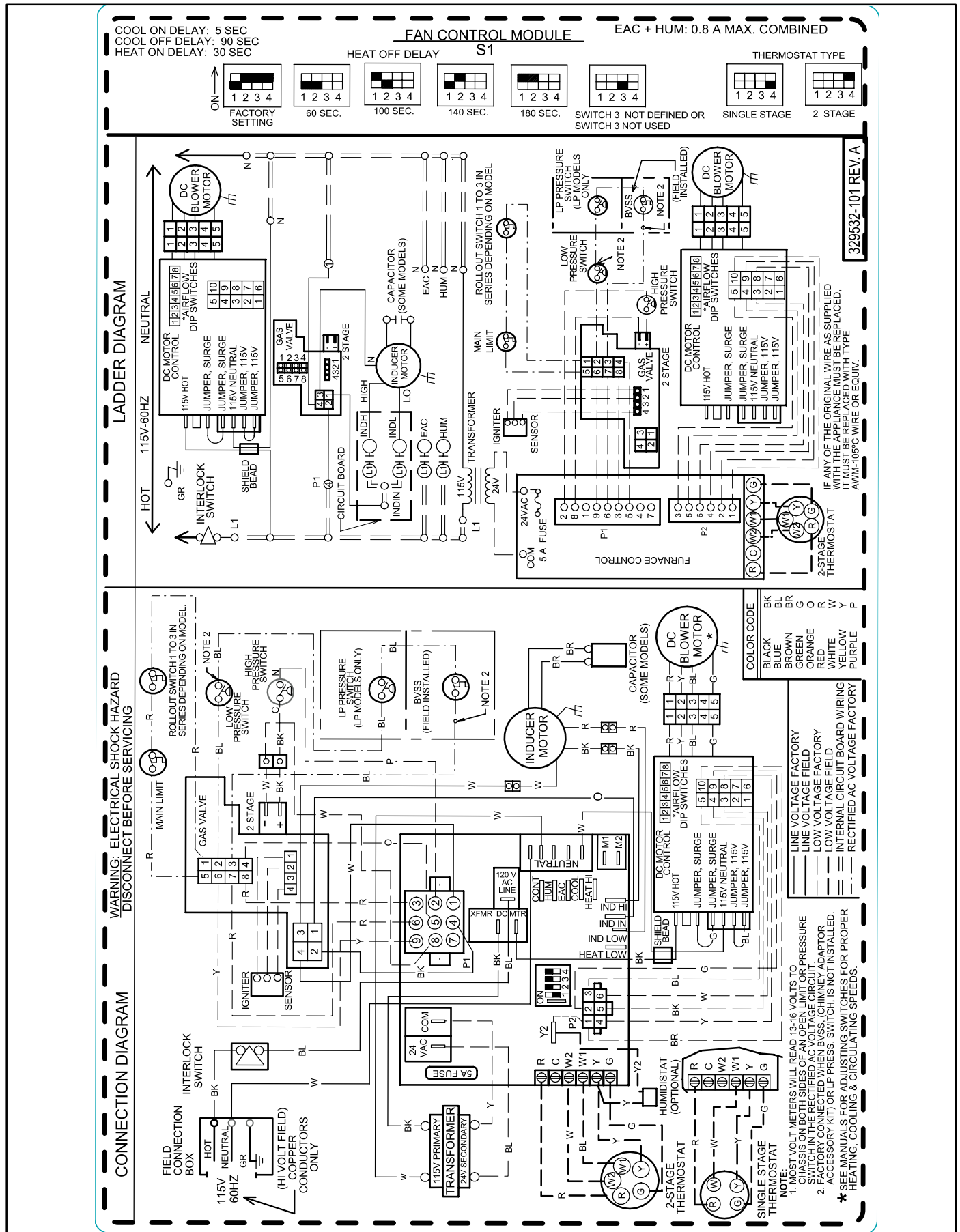
Figure 4

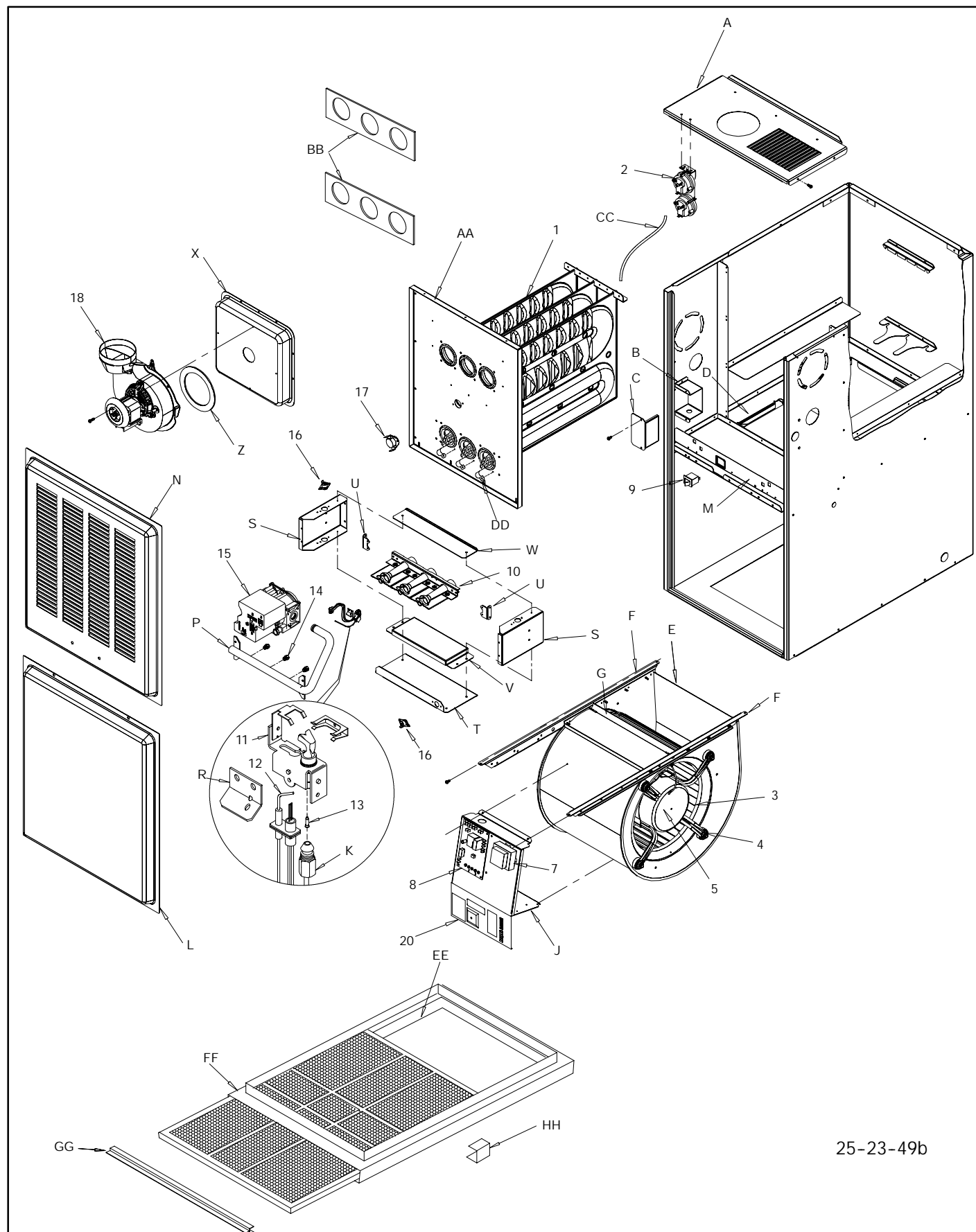


## Wiring Diagram (1/2 HP DC Blower Motor)



# Wiring Diagram (1 HP DC Blower Motor)





25-23-49b

## Replacement Parts - \*8MPV (Natural Gas)

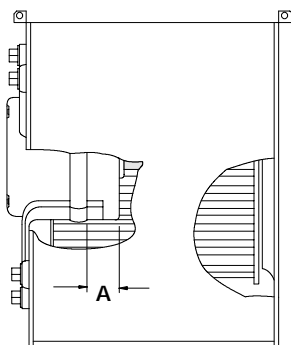
Models - \*8MPV050B12A1, \*8MPV075F14A1, \*8MPV100J20A1 & \*8MPV125J20A1

Replacement part supplied will be current active part. For parts not listed, consult place of purchase.

Key No.	Functional Parts Description	Part Number	*8MPV			
			050B12A1	075F14A1	100J20A1	125J20A1
1	Heat Exchanger	1014316	1	-	-	-
		1014318	-	1	-	-
		1014320	-	-	1	-
		1014321	-	-	-	1
2	Switch, Pressure	1013862	1	1	1	1
3	Wheel, Blower	1172129	1	-	-	-
		1013011	-	1	1	1
4	Mount, Motor kit*	1014822	1	1	1	1
5	Motor, Blower	1012478	1	-	-	-
		1012479	-	1	1	1
7	Transformer	1012722	1	1	1	1
8	Control, Fan Timer	1014459	1	1	1	1
9	Switch, Interlock	1012351	1	1	1	1
10	Burner Assembly	1008723	1	-	-	-
		1008724	-	1	-	-
		1008725	-	-	1	-
		1008726	-	-	-	1
11	Pilot/Igniter	1008731	1	1	1	1
12	Ignitor/Sensor with Clip	1009524	1	1	1	1
13	Orifice, Pilot .018	503211	1	1	1	1
14	Orifice, Burner # 42	1011351	2	3	4	5
15	Valve, Gas	1013351	1	1	1	1
16	Switch, Limit (Rollout)	1013102	2	2	2	2
17	Switch, Limit (Main)	1008417	1	1	-	-
		1320362	-	-	1	-
		1065294	-	-	-	1
18	Blower, Combustion	1013866	1	1	1	-
		1014383	-	-	-	1
19	Filter	1010364	1	-	-	-
		1010365	-	1	2	2
20	Control, Motor	1014060	1	-	-	-
		1014061	-	1	-	-
		1014062	-	-	1	-
		1014063	-	-	-	1

\*See Table below for bellyband location on motor

Bellyband Location on Motor	
Model *8MPV	A(in.)
050B12A1	1.38
075F14A1	2.09
100J20A1	2.09
125J20A1	2.09



## Replacement Parts - \*8MPV (Natural Gas)

Models - \*8MPV050B12A1, \*8MPV075F14A1, \*8MPV100J20A1 & \*8MPV125J20A1

Replacement part supplied will be current active part. For parts not listed, consult place of purchase.

Key No.	Non-Functional Parts Description	Part Number	*8MPV			
			050B12A1	075F14A1	100J20A1	125J20A1
A	Panel, Top	1013982	1	-	-	-
		1013983	-	1	-	-
		1013984	-	-	1	1
B	Box, Junction	1012349	1	1	1	1
C	Cover, Junction box	1012350	1	1	1	1
D	Partition, Blower	1014009	1	-	-	-
		1014010	-	1	-	-
		1014011	-	-	1	1
E	Housing, Blower	1012972	1	-	-	-
		1012888	-	1	1	1
F	Hanger, Blower	1012328	2	2	2	2
G	Panel, Blower Cutoff	721020013	1	-	-	-
		721020008	-	1	1	1
J	Bracket, Control Mounting	1013677	1	1	1	1
K	Tube, Pilot	1013596	1	-	-	-
		1013597	-	1	-	-
		1013598	-	-	1	1
L	Door, Blower (Heil/Arcoaire) (Heil/Arcoaire) (Heil/Arcoaire) (Comfortmaker Only) (Comfortmaker Only) (Comfortmaker Only) (Tempstar Only) (Tempstar Only) (Tempstar Only)	1014001	1	-	-	-
		1014375	-	1	-	-
		1014376	-	-	1	1
		1014002	1	-	-	-
		1014378	-	1	-	-
		1014379	-	-	1	1
		1014133	1	-	-	-
		1013973	-	1	-	-
		1013974	-	-	1	1
M	Bracket, Door	1014271	1	-	-	-
		1014272	-	1	-	-
		1014273	-	-	1	1
N	Door, Louver (Heil/Arcoaire) (Heil/Arcoaire) (Heil/Arcoaire) (Comfortmaker Only) (Comfortmaker Only) (Comfortmaker Only) (Tempstar Only) (Tempstar Only) (Tempstar Only)	1014331	1	-	-	-
		1014332	-	1	-	-
		1014333	-	-	1	1
		1014328	1	-	-	-
		1014329	-	1	-	-
		1014330	-	-	1	1
		1014132	1	-	-	-
		1014136	-	1	-	-
		1014140	-	-	1	1
P	Manifold, Gas	1013478	1	-	-	-
		1013479	-	1	-	-
		1013480	-	-	1	-
		1013481	-	-	-	1
R	Bracket, Pilot	1010901	1	1	1	1
S	Bracket, Manifold Support	1012377	2	2	2	2
T	Top, Burner Box	1013705	1	1	-	-
		1013015	-	-	1	-
		1013016	-	-	-	1
U	Bracket, Burner Box Sides	1012532	2	2	2	2
V	Baffle, Burner Box	1012338	1	1	-	-
		1012339	-	-	1	-
		1012340	-	-	-	1
W	Bottom, Burner Box	1012334	1	1	-	-
		1012335	-	-	1	-
		1012336	-	-	-	1
X	Collector Box	1014510	1	-	-	-
		1014511	-	1	-	-
		1014509	-	-	1	-
		1014512	-	-	-	1
Z	Gasket, Combustion Blower	1013540	1	1	1	1



## Replacement Parts - \*8MPV (Natural Gas)

Models - \*8MPV050B12A1, \*8MPV075F14A1, \*8MPV100J20A1 & \*8MPV125J20A1

Replacement part supplied will be current active part. For parts not listed, consult place of purchase.

Key No.	Non-Functional Parts Description	Part Number	*8MPV			
			050B12A1	075F14A1	100J20A1	125J20A1
AA	Partition, Front Heat Exchanger	1013543	1	-	-	-
		1013545	-	1	-	-
		1013547	-	-	1	-
		1013548	-	-	-	1
BB	Gaskets, Heat Exchanger	1013991	2	-	-	-
		1013992	-	2	-	-
		1013993	-	-	2	-
		1013994	-	-	-	2
CC	Tubing, Silicone	1014522	1	-	-	-
		1014523	-	1	-	-
		1014520	-	-	1	1
		1014524	1	1	1	1
		1014525	1	1	1	1
DD	Baffle, Nox	1014019	2	3	4	5
EE	Wrapper, Filter Rack	741010042	1	-	-	-
		741010039	-	1	2	2
FF	Front, Filter Rack	741020004	1	-	-	-
		741020001	-	1	2	2
GG	Cover, Filter Plastic	2791042	1	-	-	-
		2791043	-	1	2	2
HH	Clip, Filter	1008482	3	3	3	3
)	<b>Parts Not Illustrated</b>					
)	Fuse, 5 Amp	1083348	1	1	1	1
)	Harness, Wire Low Volt	1012520	1	1	1	1
)	Harness, Wire High Volt	1012521	1	1	1	1
)	Tap, Pressure	1006230	1	1	1	1
)	Door Screws	1014488	1	1	1	1
)	Door ScrewGrommets	1171990	1	1	1	1
)	Manual, Installation	441 01 2019 08	1	1	1	1
)	Manual, Users	441 02 2010 04	1	1	1	1

Manufacturers Number (Mfr No -See Rating Plate) ALL Models										
Specifications										
	*8MPT050B12A		*8MPT075F14A		*8MPT100F14A		*8MPT100J20A		*8MPT125J20A	
General Gas Type	Nat	LP	Nat	LP	Nat	LP	Nat	LP	Nat	LP
Input (Btuh) Std/Alt.    Hi Fire Lo Fire	50,000 35,000		75,000 52,500		100,000 70,000		100,000 70,000		125,000 87,500	
Output (Btuh) Std/Alt.    Hi Fire Lo Fire	40,000 28,000		60,000 42,000		81,000 57,000		81,000 61,000		101,000 71,000	
Temp. Rise (°F)        Hi Fire Lo Fire	30-60 25-55		30-60 25-55		35-65 35-65		35-65 35-65		30-60 25-55	
Electrical (Volts/Hz)	115/60		115/60		115/60		115/60		115/60	
Rating Plate Amps.	8.8		9.3		10.0		15.3		13.9	
Transformer Size (VA) T'stat Heat Anticipator	40 .30	40 .30	40 .30	40 .30	40 .30	40 .30	40 .30	40 .30	40 .30	40 .30
<b>Gas &amp; Ignition</b> GStd. Main Orifices (No/Size)	2/#42	2/#54	3/#42	3/#54	4/#42	4/#54	4/#42	4/#54	5/#42	5/#54
Gas Valve (Honeywell) Regulation Type Manifold Press. Hi Fire (" WC) Lo Fire (" WC)	SV 9541 SNAP 3.5 1.7	SV 9541 SNAP 10.0 4.9	SV 9541 SNAP 3.5 1.7	SV 9541 SNAP 10.0 4.9	SV 9541 SNAP 3.5 1.7	SV 9541 SNAP 10.0 4.9	SV 9541 SNAP 3.5 1.7	SV 9541 SNAP 10.0 4.9	SV 9541 SNAP 3.5 1.7	SV 9541 SNAP 10.0 4.9
Pilot Orifice Size	.018	.011	.018	.011	.018	.011	.018	.011	.018	.011
Ignition Type/Series (Honeywell)	HSP	HSP	HSP	HSP	HSP	HSP	HSP	HSP	HSP	HSP
<b>Combustion</b> Flue Outlet Size (Inches)	4	4	4	4	4	4	4	4	4	4
<b>Limits &amp; Controls</b> Fan Control (Type) Fan Control                On delay (Timed-secs)               Off delay	HW ST9162A 30 60,100,140,180		HW ST9162A 30 60,100,140,180		HW ST9162A 30 60,100,140,180		HW ST9162A 30 60,100,140,180		HW ST9162A 30 60,100,140,180	
Thermal Sensor (°F) Limit Control Setting (°F)	300 See Limit in Parts List		300 See Limit in Parts List		300 See Limit in Parts List		300 See Limit in Parts List		300 See Limit in Parts List	
Std. Pressure Sw. (Part No) Hi Fire Press (Close) Hi Fire Press (Open) Lo Fire Press (Close) Lo Fire Press (Open)	1013862 -0.69 -0.59 -0.40 -0.30		1013862 -0.69 -0.59 -0.40 -0.30		1013862 -0.69 -0.59 -0.40 -0.30		1013862 -0.69 -0.59 -0.40 -0.30		1013862 -0.69 -0.59 -0.40 -0.30	
<b>Blower Data</b> Type & Size Motor Amps/Rpm Motor Type/H.p. Cap. Mfd/Volts Filter Type Filter Size ("") Min. Cool Cap. (Tons) Max. Cool Cap. (Tons)	11-8 10.3/1100 PSC/1/2 10/370 Washable 14x25x1 1.5 3		11-10 10.3/1100 PSC/1/2 10/370 Washable 16x25x1 1.5 3.5		11-10 8/900 PSC/1/2 7.5/370 Washable 16x25x1 1.5 3.5		11-10 10/1050 PSC/1/2 10/370 Washable 16x25x1 (2) 3 5		11-10 10/1050 PSC/1/2 40/370 Washable 16x25x1 (2) 3 5	
<b>Gas Conversion Kits</b> Nat to LP LP to Nat	*1011789 *1011787		*1011789 *1011787		*1011789 *1011787		*1011789 *1011787		*1011789 *1011787	

\*Must be ordered from Service Parts

Use the Fuel Gas Code to establish proper vent sizing.

## CIRCULATION AIR BLOWER DATA

### \*8MPT050B12

External Static Pressure Inches of W.C.	Air Delivery in Cubic Feet per Minute (C.F.M.) (Furnace Rated @0.5" WC ESP)				
	TAP	LOW	MED L	MED H	HIGH
	.10	472	704	1167	1387
	.30	365	638	1102	1288
	.50	290	572	1035	1194
	.70	209	522	939	1070
	.90	---	443	820	937
	1.00	---	370	753	858

### \*8MPT075F14

External Static Pressure Inches of W.C.	Air Delivery in Cubic Feet per Minute (C.F.M.) (Furnace Rated @0.5" WC ESP)				
	TAP	LOW	MED L	MED H	HIGH
	.10	595	767	1310	1683
	.30	538	673	1267	1611
	.50	400	590	1224	1510
	.70	338	489	1144	1372
	.90	280	382	986	1191
	1.00	242	338	890	1073

### \*8MPT100F14

External Static Pressure Inches of W.C.	Air Delivery in Cubic Feet per Minute (C.F.M.) (Furnace Rated @0.5" WC ESP)				
	TAP	LOW	MED L	MED H	HIGH
	.10	770	985	1328	1760
	.30	648	873	1235	1675
	.50	544	772	1115	1551
	.70	457	684	1036	1404
	.90	361	572	895	1215
	1.00	308	508	811	1093

\* Denotes Brand

### \*8MPT100J20

External Static Pressure Inches of W.C.	Air Delivery in Cubic Feet per Minute (C.F.M.) (Furnace Rated @0.5" WC ESP)				
	TAP	LOW	MED L	MED H	HIGH
	.10	773	1045	1453	2147
	.30	755	1037	1469	2128
	.50	712	1020	1459	2078
	.70	647	979	1424	1963
	.90	554	894	1347	1795
	1.00	497	828	1262	1705

### \*8MPT125J20

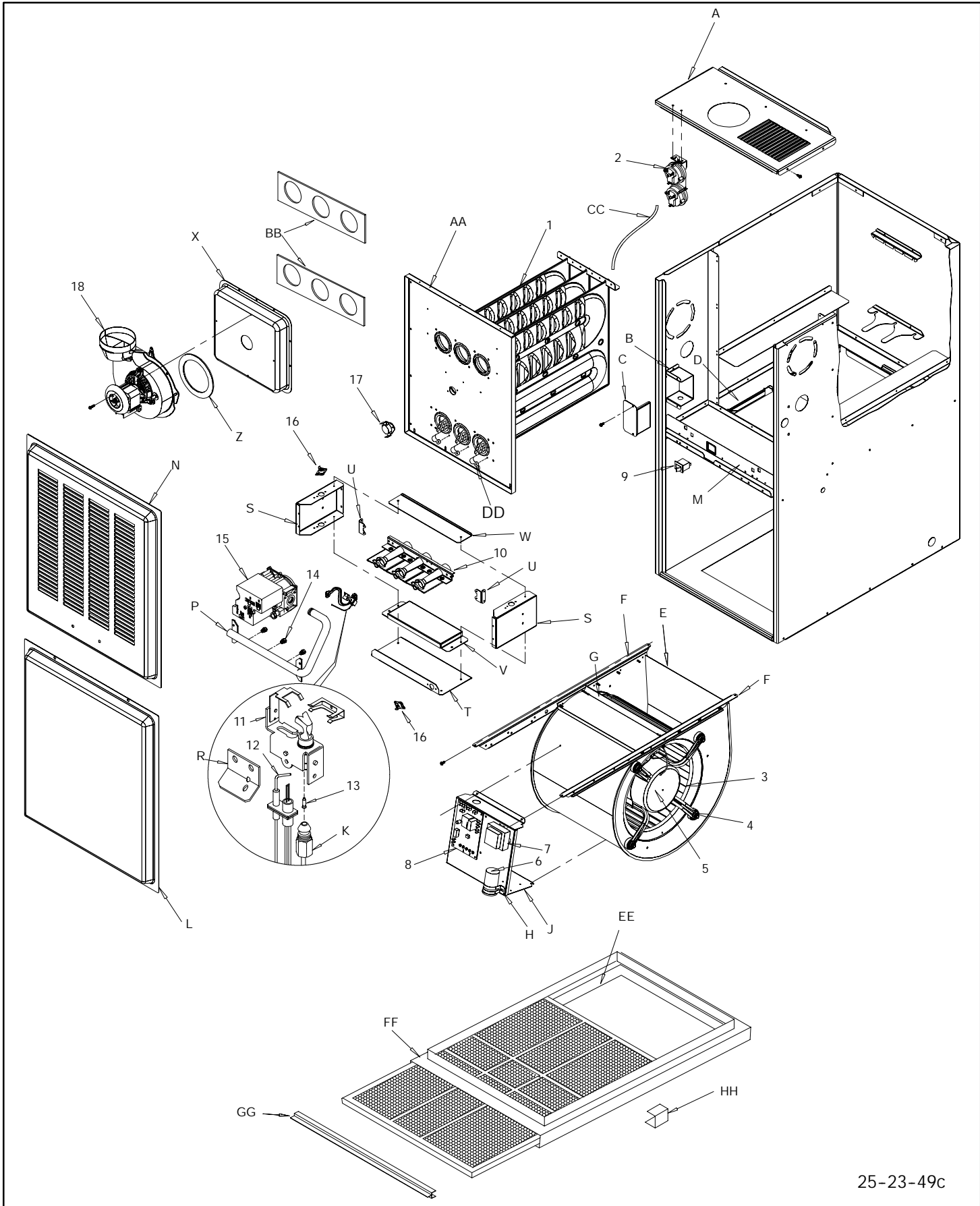
External Static Pressure Inches of W.C.	Air Delivery in Cubic Feet per Minute (C.F.M.) (Furnace Rated @0.5" WC ESP)				
	TAP	LOW	MED L	MED H	HIGH
	.10	860	1149	1666	2147
	.30	836	1158	1577	2126
	.50	805	1140	1561	2148
	.70	758	1081	1516	1922
	.90	661	1009	1428	1767
	1.00	614	925	1357	1663

NOTE: 125J20 - Reduce airflow by 5% if bottom return only

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441 01 2019 08



\*8MPT (Parts)\_\_\_\_\_



## Replacement Parts - \*8MPT (Natural Gas)

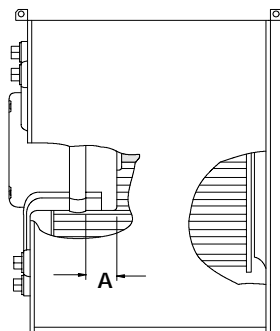
**Models** - \*8MPT050B12A1, \*8MPT075F14A1, \*8MPT100F14A1, \*8MPT100J20A1, \*8MPT125J20A1

Replacement part supplied will be current active part. For parts not listed, consult place of purchase.

Key No.	Functional Parts Description	Part Number	*8MPT				
			050B12A1	075F14A1	100F14A1	100J20A1	125J20A1
1	Heat Exchanger	1014316	1	-	-	-	-
		1014318	-	1	-	-	-
		1014319	-	-	1	-	-
		1014320	-	-	-	1	-
		1014321	-	-	-	-	1
2	Switch, Pressure	1013862	1	1	1	1	1
3	Wheel, Blower	1172129	1	-	-	-	-
		1013011	-	1	1	1	1
4	Mount, Motor kit *	1014824	1	-	-	-	-
		1014822	-	1	1	-	-
		1014823	-	-	-	1	1
5	Motor, Blower 1/115 1/2 CCW	1172490	1	1	-	-	-
		1172487	-	-	1	-	-
		1172488	-	-	-	1	1
6	Capacitor	1171729	1	1	-	-	-
		1171728	-	-	1	-	-
		1171982	-	-	-	1	1
7	Transformer	1012722	1	1	1	1	1
8	Control, Fan Timer	1014459	1	1	1	1	1
9	Switch, Interlock	1012351	1	1	1	1	1
10	Burner Assembly	1008723	1	-	-	-	-
		1008724	-	1	-	-	-
		1008725	-	-	1	1	-
		1008726	-	-	-	-	1
11	Pilot/Igniter	1008731	1	1	1	1	1
12	Ignitor/Sensor with Clip	1009524	1	1	1	1	1
13	Orifice, Pilot .018	503211	1	1	1	1	1
14	Orifice, Burner # 42	1011351	2	3	4	4	5
15	Valve, Gas	1013351	1	1	1	1	1
16	Switch, Limit (Rollout)	1013102	2	2	2	2	2
17	Switch, Limit (Main)	1008417	1	1	-	-	-
		1320362	-	-	1	1	-
		1065294	-	-	-	-	1
18	Blower, Combustion	1013866	1	1	1	1	-
		1014383	-	-	-	-	1
19	Filter	1010364	1	-	-	-	-
		1010365	-	1	1	2	2

\*See Table below for bellyband location on motor

Bellyband Location on Motor	
Model *8MPT	A(in.)
050B12A1	1.38
075F14A1	1.38
100F14A1	1.38
100J20A1	1.81
125J20A1	1.81



# Replacement Parts - \*8MPT (Natural Gas)

Models - \*8MPT050B12A1, \*8MPT075F14A1, \*8MPT100F14A1, \*8MPT100J20A1, \*8MPT125J20A1

Replacement part supplied will be current active part. For parts not listed, consult place of purchase.

Key No.	Non-Functional Parts Description	Part Number	*8MPT				
			050B12A1	075F14A1	100F14A1	100J20A1	125J20A1
A	Panel, Top	1013982	1	-	-	-	-
		1013983	-	1	1	-	-
		1013984	-	-	-	1	1
B	Box, Junction	1012349	1	1	1	1	1
C	Cover, Junction box	1012350	1	1	1	1	1
D	Partition, Blower	1014009	1	-	-	-	-
		1014010	-	1	1	-	-
		1014011	-	-	-	1	1
E	Housing, Blower	1012972	1	-	-	-	-
		1012888	-	1	1	1	1
F	Hanger, Blower	1012328	2	2	2	2	2
G	Panel, Blower Cutoff	721020013	1	-	-	-	-
		721020008	-	1	1	1	1
H	Clamp, Capacitor	1170643	1	1	1	-	-
		1014315	-	-	-	1	1
J	Bracket, Control Mounting	1013677	1	1	1	1	1
K	Tube, Pilot	1013596	1	-	-	-	-
		1013597	-	1	-	-	-
		1013598	-	-	1	1	1
L	Door, Blower (Heil/Arcoaire)	1014001	1	-	-	-	-
		1014375	-	1	1	-	-
		1014376	-	-	-	1	1
		1014002	1	-	-	-	-
		1014378	-	1	1	-	-
		1014379	-	-	-	1	1
		1013606	1	1	-	-	-
		1013607	-	-	1	-	-
M	Bracket, Door	1013608	-	-	-	1	1
		1014271	1	-	-	-	-
		1014272	-	1	1	-	-
N	Door, Louver (Heil/Arcoaire)	1014273	-	-	-	1	1
		1014331	1	-	-	-	-
		1014332	-	1	1	-	-
		1014333	-	-	-	1	1
		1014328	1	-	-	-	-
		1014329	-	1	1	-	-
		1014330	-	-	-	1	1
		1014334	1	1	1	-	-
P	Manifold, Gas	1014335	-	-	-	-	-
		1014336	-	-	-	1	1
		1013478	1	-	-	-	-
		1013479	-	1	-	-	-
		1013480	-	-	1	1	-
R	Bracket, Pilot	1013481	-	-	-	-	1
		1010901	1	1	1	1	1
S	Bracket, Manifold Support	1012377	2	2	2	2	2
T	Top, Burner Box	1013705	1	1	-	-	-
		1013015	-	-	1	1	-
		1013016	-	-	-	-	1
U	Bracket, Burner Box Sides	1012532	2	2	2	2	2
V	Baffle, Burner Box	1012338	1	1	-	-	-
		1012339	-	-	1	1	-
		1012340	-	-	-	-	1
W	Bottom, Burner Box	1012334	1	1	-	-	-
		1012335	-	-	1	1	-
		1012336	-	-	-	-	1
X	Collector Box	1014510	1	-	-	-	-
		1014511	-	1	-	-	-
		1014509	-	-	1	1	-
		1014512	-	-	-	-	1

## ***Replacement Parts - \*8MPT*** (Natural Gas)

**Models** - \*8MPT050B12A1, \*8MPT075F14A1, \*8MPT100F14A1, \*8MPT100J20A1, \*8MPT125J20A1

Replacement part supplied will be current active part. For parts not listed, consult place of purchase.

Key No.	Non-Functional Parts Description	Part Number	*8MPT				
			050B12A1	075F14A1	100F14A1	100J20A1	125J20A1
Z	Gasket, Combustion Blower	1013540	1	1	1	1	1
AA	Partition, Front Heat Exchanger	1013543	1	-	-	-	-
		1013545	-	1	-	-	-
		1013546	-	-	1	-	-
		1013547	-	-	-	1	-
		1013548	-	-	-	-	1
BB	Gaskets, Heat Exchanger	1013991	2	-	-	-	-
		1013992	-	2	-	-	-
		1013993	-	-	2	2	-
		1013994	-	-	-	-	2
CC	Tubing, Silicone	1170886	1	1	1	1	1
DD	Baffle, Nox	1014019	2	3	4	4	5
EE	Wrapper, Filter Rack	741010042	1	-	-	-	-
		741010039	-	1	1	2	2
FF	Front, Filter Rack	741020004	1	-	-	-	-
		741020001	-	1	1	2	2
GG	Cover, Filter Plastic	2791042	1	-	-	-	-
		2791043	-	1	1	2	2
HH	Clip, Filter	1008482	3	3	3	3	3
) (	<b>Parts Not Illustrated</b>						
) (	Fuse, 5 Amp	1083348	1	1	1	1	1
) (	Harness, Wire	1013863	1	1	1	1	1
) (	Tap, Pressure	1006230	1	1	1	1	1
) (	Door Screws	1014488	4	4	4	4	4
) (	Door Screw Grommets	1171990	4	4	4	4	4
) (	Manual, Installation	441 01 2019 08	1	1	1	1	1
) (	Manual, Users	441 02 2010 04	1	1	1	1	1