

**INSTALLATION INSTRUCTIONS****Modulating Condensing Furnaces With Variable Speed Blowers**

\*MQ Upflow / Horizontal Model

**⚠ WARNING****FIRE OR EXPLOSION HAZARD**

- Failure to follow safety warnings exactly could result in serious injury or property damage.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

**WHAT TO DO IF YOU SMELL GAS**

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

**⚠ AVERTISSEMENT****RISQUE D'INCENDIE OU D'EXPLOSION**

- Le non-respect des avertissements de sécurité pourrait entraîner des blessures graves, la mort ou des dommages matériels.
- L'installation et l'entretien doivent être effectués par un installateur qualifié, un organisme de service ou le fournisseur de gazstaller, service agency or the gas supplier.
- Ne pas entreposer ni utiliser de l'essence ni d'autres vapeurs ou liquides inflammables dans le voisinage de cet appareil, ni de tout autre appareil.

**QUE FAIRE S'IL Y A UNE ODEUR DE GAZ**

- Ne pas tenter d'allumer aucun appareil.
- Ne toucher à aucun interrupteur électrique; n'utiliser aucun téléphone dans le bâtiment.
- Évacuer l'immeuble immédiatement.
- Appeler immédiatement le fournisseur de gaz en employant le téléphone d'un voisin. Respecter à la lettre les instructions du fournisseur de gaz.
- Si personne ne répond, appeler le service des incendies.

**NOTE TO INSTALLER:** This installation manual focuses on installing the MQ furnace in a single zone only. The MQ furnace may also be installed with the iQ Zone zoning system. The installation of the furnace itself does not change. Additional details, such as the duct/damper design, and the low voltage wiring may be found in the following publications:

- iQ Drive System Field Wiring Instructions
- Airzone iQ Zone Installation Manual

## TABLE OF CONTENTS

<b>IMPORTANT SAFETY INFORMATION .....</b>	<b>3</b>	<b>FURNACE INSTALLATION .....</b>	<b>16</b>
<b>REQUIREMENTS &amp; CODES .....</b>	<b>4</b>	General Requirements .....	16
Combustion Air Quality.....	5	Upflow Furnaces .....	16
Heating Load.....	5	Horizontal Furnaces .....	16
Operation of Furnace During Construction .....	6	Bottom Panel Removal.....	16
Installation in a Garage .....	6	Alternate Bottom Panel Removal .....	17
Clearances to Combustible Materials.....	6	Inducer & Venting Options.....	17
		Inducer Assembly Rotation .....	17
<b>COMBUSTION AIR &amp; VENTING REQUIREMENTS....</b>	<b>7</b>	Accessories.....	18
Important Information .....	8	Finish Flange .....	18
Direct Vent Furnaces .....	8	Rubber Grommets.....	18
Conventional Vent Systems - Confined Spaces .....	8	PVC Components .....	18
Air From Inside.....	9	Typical Orientation .....	18
Outdoor Air from a Crawl Space or		Alternate Orientation .....	18
Vented Attic .....	9	Condensate Drain Lines.....	19
Outdoor Air Using Vertical Ducts.....	9	Pressure Switch Tubing .....	20
Outdoor Air Using Horizontal Ducts .....	9		
Air Directly Through an Exterior Wall .....	9	<b>GAS SUPPLY &amp; PIPING .....</b>	<b>21</b>
Alternate Method of Providing Air from		Leak Check .....	21
Outside.....	10	High-Altitude Application .....	22
Conventional Vent Systems - Unconfined Spaces ..	10	Conversion to LP/Propane .....	23
Category IV Venting .....	10		
Vent Pipe Material.....	11	<b>ELECTRICAL WIRING.....</b>	<b>23</b>
Vent Pipe Length & Diameter.....	11	Line Voltage Wiring.....	24
Vent Pipe Installation.....	12	Thermostat / Low Voltage Connections.....	24
Outdoor Terminations - Horizontal Venting.....	13	Single-Stage AC.....	24
Outdoor Terminations - Vertical Venting .....	13	Two-Stage AC .....	24
Vent Freezing Protection .....	13	Single-Stage Heat Pump .....	24
Existing Installations .....	14	Two-Stage Heat Pump .....	24
Condensate Disposal .....	14	Grounding.....	26
<b>CIRCULATING AIR REQUIREMENTS.....</b>	<b>14</b>		
Plenums & Air Ducts .....	14	<b>START-UP &amp; ADJUSTMENTS.....</b>	<b>26</b>
Return Air Connections .....	15	Pre-Start Checklist .....	26
Upflow & Horizontal Furnaces .....	15	System Configuration.....	27
Downflow Furnaces .....	15	Start-Up Procedures .....	27
Supply Air Connections .....	15	Verifying & Adjusting Input Rate.....	27
Acoustical Treatments .....	15	Verifying & Adjusting Temperature Rise .....	27
		Verifying Burner Operation.....	28
		Verifying Operation of the Supply Air	
		Limit Switch .....	28
		<b>OPERATING SEQUENCE .....</b>	<b>28</b>
		Heating Cycle .....	28
		Cooling Cycle .....	29
		Fan Mode .....	29
		Intermittent Fan Mode .....	29

MAINTENANCE .....	29
TROUBLESHOOTING .....	30
FIGURES & TABLES .....	31
Figure 23 - MQ Furnace Dimensions .....	31
Airflow Data .....	31
Table 8 - CFM Targets.....	31
Gas Information.....	32
Table 9 - Gas Flow Rates.....	32
Table 10 - Gas Pipe Capacities.....	32
Electrical Information.....	33
Table 11 - Wire length & Voltage Specs .....	33
Figure 24 - Variable Speed Motor Control Board .....	33
Figure 25 - Modulating Furnace Control Board .....	33
Figure 26 - MQ Wiring Diagram .....	34
Venting Information .....	35
Table 12 - Vent Termination Clearances .....	35
Figure 27 - Upflow Options .....	36
Figure 28 - Horizontal Options .....	37
Figure 29 - Horizontal & Vertical Venting.....	38
Furnace Components.....	39
Figure 30 - Component Locations.....	39
INSTALLATION / PERFORMANCE CHECKLIST .....	40

## IMPORTANT SAFETY INFORMATION

**INSTALLER:** Please read all instructions before servicing this equipment. Pay attention to all safety warnings and any other special notes highlighted in the manual. Safety markings are used frequently throughout this manual to designate a degree or level of seriousness and should not be ignored.

**WARNING** - indicates a potentially hazardous situation that if not avoided, could result in personal injury or death.

**CAUTION** - indicates a potentially hazardous situation that if not avoided, may result in minor or moderate injury or property damage.

### **WARNING:**

**The safety information listed in this manual must be followed during the installation, service, and operation of this unit. Unqualified individuals should not attempt to interpret these instructions or install this equipment. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.**

### **WARNING:**

**Unless otherwise noted in these instructions, only factory authorized kits or accessories may be used with or when modifying this product.**

### **WARNING:**

**Improper installation, service, adjustment, or maintenance may cause explosion, fire, electrical shock or other hazardous conditions which may result in personal injury or property damage. Unless otherwise noted in these instructions, only factory authorized kits or accessories may be used with this product.**

### **WARNING:**

**Do not install this furnace if any part has been submerged under water. A flood damaged furnace is extremely dangerous. Attempts to use the furnace may result in fire or explosion. A qualified service agency should be contacted to inspect the furnace and to replace any electrical or control system parts that have been wet or under water.**

- To minimize equipment failure or personal injury, it is essential that only qualified individuals install, service, or maintain this equipment. If you do not possess mechanical skills or tools, call your local dealer for assistance.
- Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.
- Use caution when handling this appliance or removing components. Personal injury can occur from sharp metal edges present in all sheet metal constructed equipment.
- Do not store any of the following on, or in contact with, the unit: Rags, brooms, vacuum cleaners, or other cleaning tools, spray or aerosol cans, soap powders, bleaches, waxes, cleaning compounds, plastics or plastic containers, paper bags or other paper products, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, paint thinners, or other volatile fluids.
- The installer should become familiar with the unit's wiring diagram before making any electrical connections to the unit. See Figure 26 (page 34) or the unit wiring label.
- Always reinstall the doors on the indoor blower after servicing or cleaning/changing the filters. Do not operate the indoor blower without all doors and covers in place.

## REQUIREMENTS & CODES

### **WARNING:**

**The safety information listed below must be followed during the installation, service, and operation of this furnace. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.**

- This furnace must be installed in accordance with these instructions, all applicable local building codes and the current revision of the National Fuel Gas Code (NFPA54/ANSI Z223.1) or the Natural Gas and Propane Installation Code, CAN/CGA B149.1.
- Use only with type of gas approved for this furnace. Refer to the furnace rating plate.
- Install this furnace only in a location and position as specified in Figure 1 (page 6).
- Provide adequate combustion and ventilation air to the furnace space as specified on pages 7 - 10.
- Provide adequate clearances around the vent air intake terminal as specified in Figures 7 - 10 (page 12)
- Combustion products must be discharged outdoors. Connect this furnace to an approved vent system only, as specified on pages 10 - 14.
- Never test for gas leaks with an open flame. Use a commercially available soap solution to check all connections. See pages 21 - 22.
- This furnace is designed to operate with a maximum external pressure rise of 0.5 inches of water column. Consult Table 7 (page 31) and the rating plate for the proper circulating air flow and temperature rise. It is important that the duct system be designed to provide the correct flow rates and external pressure rise. An improperly designed duct system can result in nuisance shutdowns, and comfort or noise issues.
- When supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by duct(s) sealed to the furnace casing and terminating in the conditioned space. See pages 14 - 15.
- A gas-fired furnace for installation in a residential garage must be installed as specified on page 6.
- This furnace may be used for temporary heating of buildings or structures under construction. See the guidelines listed on page 6.
- The Commonwealth of Massachusetts requires compliance with regulation 248 CMR 4.00 and 5.00 for installation of through – the – wall vented gas appliances as follows:
  1. For direct-vent appliances, mechanical-vent heating appliances or domestic hot water equipment, where the bottom of the vent terminal and the air intake is installed below four feet above grade the following requirements must be satisfied:
    - a.) A carbon monoxide (CO) detector and alarm shall be placed on each floor level where there are bedrooms. The detector shall comply with NFPA 720 (2005 Edition) and be mounted in the living area outside the bedroom(s).
    - b.) A (CO) detector shall be located in the room that houses the appliance or equipment and shall:
      - Be powered by the same electrical circuit as the appliance or equipment. Only one service switch shall power the appliance and the (CO) detector;
      - Have battery back-up power;
      - Meet ANSI/UL 2034 Standards and comply with NFPA 720 (2005 Edition); and Approved and listed by a Nationally Recognized Testing Laboratory as recognized under 527 CMR.
    - c.) A Product-approved vent terminal must be used, and if applicable, a product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the appliance or equipment at the completion of the installation.
    - d.) A metal or plastic identification plate shall be mounted at the exterior of the building, four feet directly above the location of vent terminal. The plate shall be of sufficient size, easily read from a distance of eight feet away, and read "Gas Vent Directly Below".
  2. For direct-vent appliances, mechanical-vent heating appliances or domestic hot water equipment where the bottom of the vent terminal and the air intake is installed above four feet above grade the following requirements must be satisfied:
    - a.) A (CO) detector and alarm shall be placed on each floor level where there are bedrooms. The detector shall comply with NFPA 720 (2005 Edition) and be mounted in the living area outside the bedroom(s).
    - b.) The (CO) detector shall:
      - Be located in the room that houses the appliance or equipment;
      - Be hard-wired or battery powered or both.
      - Shall comply with NFPA 720 (2005 Edition).
    - c.) A product-approved vent terminal must be used, and if applicable, a product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the appliance or equipment at the completion of the installation.

The information listed below is for reference purposes only and does not necessarily have jurisdiction over local or state codes. Always consult with local authorities before installing any gas appliance.

#### Combustion & Ventilation Air

- US: National Fuel Gas Code (NFGC), Air for Combustion and Ventilation
- CANADA: Natural Gas and Propane Installation Codes (NSCNGPIC), Venting Systems and Air Supply for Appliances

#### Duct Systems

- US and CANADA: Air Conditioning Contractors Association (ACCA) Manual D, Sheet Metal and Air Conditioning Contractors National Association (SMACNA), or American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Fundamentals Handbook

#### Electrical Connections

- US: National Electrical Code (NEC) ANSI/NFPA 70
- CANADA: Canadian Electrical Code CSA C22.1

#### Gas Piping & Gas Pipe Pressure Testing

- US: NFGC and National Plumbing Codes
- CANADA: NSCNGPIC

#### General Installation

- US: Current edition of the NFGC and the NFPA 90B. For copies, contact the National Fire Protection Association Inc., Batterymarch Park, Quincy, MA 02269; or American Gas Association, 400 N. Capitol, N.W., Washington DC 20001 or [www.NFPA.org](http://www.NFPA.org)
- CANADA: NSCNGPIC. For a copy, contact Standard Sales, CSA International, 178 Rexdale Boulevard, Etobicoke (Toronto), Ontario, M9W 1R3 Canada

#### Safety

- US: (NFGC) NFPA 54–1999/ANSI Z223.1 and the Installation Standards, Warm Air Heating and Air Conditioning Systems ANSI/NFPA 90B.
- CANADA: CAN/CGA-B149.1 and .2–M00 National Standard of Canada. (NSCNGPIC)

- Installations in these locations may require outdoor air for combustion, due to chemical exposures:

Commercial buildings  
Buildings with indoor pools  
Furnaces installed in laundry rooms  
Furnaces installed in hobby or craft rooms

- Exposure to the following substances in the combustion air supply may require outdoor air for combustion:

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

#### Heating Load

This furnace should be sized to provide the design heating load requirement. 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.** The ductwork should be appropriately sized to the capacity of the furnace to ensure its proper airflow rating.

Zoned systems may increase undesirable effects of oversizing. Extra care must be taken when estimating the heating load for zoned installations.

For installations above 2,000 ft., the furnace should have a sea level input rating large enough that it will meet the heating load after deration for altitude.

The \*MQ modulating furnace is capable of controlling its heat output to meet different heating loads. With 11 available continuous heat outputs (or “steps”), the MQ furnace can function like 11 different furnaces.

A step defines the gas input rate, an inducer blower speed, and circulating air flow. Steps 1 -11 cover input rates from 50% to 100% of the furnaces maximum input rate. The furnace begins at step 6 (or 75% of full rate) for 30 seconds and then goes to step 1 (or 50%). Afterwards, the iQ Drive® thermostat periodically reevaluates the heat output needed and changes the step accordingly.

If the heating load is less than 50% of maximum, the furnace turns off and on to a fixed 15 minute cycle. There are 5 additional steps that use different on and off times. The iQ Drive® thermostat automatically adjusts how long the furnace is on during each cycle. Overall, the iQ Drive® thermostat can control the heat delivered to the residence down to 1/7th of the maximum input rate.

## Combustion Air Quality

### CAUTION:

**Combustion air must not be drawn from a corrosive atmosphere.**

To maximize heat exchanger life, the combustion air must be free of chemicals that can form corrosive acidic compounds in the combustion gases. The recommended source of combustion air is to use outdoor air. However, the use of indoor air in most applications is acceptable except as listed:

- If the furnace is installed in a confined space, it is required that the necessary combustion air come from the outdoors by way of attic, crawl space, air duct, or direct opening. For Installations in confined spaces, see pages 8 - 10 for combustion air requirements.

## Operation of Furnace During Construction

### **CAUTION:**

Failure to follow these instructions will void the factory warranty and may significantly reduce the life or the performance of the furnace, and/or result in other unsafe conditions. It is the responsibility of the installing contractor to insure these provisions are met.

Operating gas furnaces in construction environments can cause a variety of problems with the furnace. Proper use of commercial portable space heating equipment during construction is recommended. This gas furnace may be used during construction if it is not in violation of any applicable codes and the following criteria are met:

- The installation must meet all applicable codes. The furnace must be permanently installed according to the instructions supplied with the furnace including electrical supply, gas supply, duct work and venting. The furnace must be controlled by a thermostat properly installed according to the instructions supplied with the furnace and thermostat. The installation must include a properly installed filter in the return air system with no by-pass air. The filter must be inspected frequently and replaced when necessary.
- Combustion air must be supplied from outside the structure and located such that dust and gases from construction activity are not introduced into the combustion system.
- Provisions must be made to insure that condensate does not freeze in the furnace or condensate drain lines during operation and during idle times; for example, overnight if turned off.
- Before occupying the structure: The filter must be replaced or cleaned, the duct work must be inspected and cleaned of any construction debris, and the furnace must be cleaned and/or repaired if found to be dirty, damaged, or malfunctioning in any way by a qualified HVAC technician. The furnace shall be inspected and approved by applicable local authority even if this requires redundant inspections.
- Serial numbers for furnaces used during construction must be submitted in writing (fax and email also acceptable). This information will be used to track the long-term affects of the use during construction on furnaces. Proof of this submittal shall be available for the final inspection of the furnace prior to occupancy.
- This furnace is designed to operate with return air temperatures in ranges normally found in occupied residences, including setbacks. Minimum continuous return temperature must not be below 60° F (15° C). Occasionally a temporary return temperature of 55° F (12° C) is acceptable. However, operation with a return temperature below 55° F (12° C) is not allowed.

## Installation in a Garage

### **WARNING:**

#### **FIRE AND EXPLOSION HAZARD**

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Storage of or use of gasoline or other flammable vapors or liquids in the vicinity of this or any appliance can result in serious injury or death.

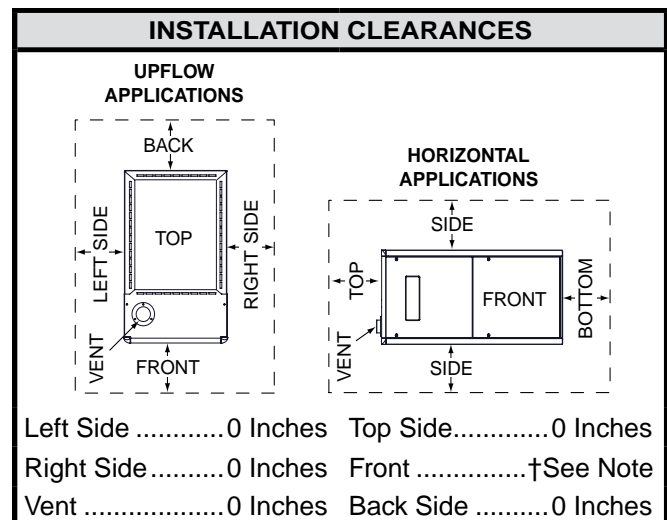
The \*MQ Gas-fired furnace may be installed in a residential garage with the provision that the burners and igniter are located no less than 18 inches (457mm) above the floor. The furnace must be located or protected to prevent physical damage by vehicles.

#### **Clearances to Combustible Materials**

This furnace is Design Certified in the U.S. and Canada by CSA International for the minimum clearances to combustible material listed in Figure 1. To obtain model number and specific clearance information, refer to the furnace rating plate, located inside of the furnace cabinet.

Access for positioning and servicing the unit must be considered when locating unit. The need to provide clearance for access to panels or doors may require clearance distances over and above the requirements.

**Allow 24 inches minimum clearance from the front of the unit. However 36 inches is strongly recommended.**



†**NOTE:** Allow 24 inches minimum clearance for servicing. Recommended clearance is 36 inches.

**Figure 1. Minimum Unit Clearances**

## COMBUSTION AIR & VENTING REQUIREMENTS

### **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 with each individual appliance connected to the venting system being placed in 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 the CSA B149.1, Natural Gas and Propane Installation Codes 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.
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 Codes.
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.

### **AVERTISSEMENT:**

#### **RISQUE D'EMPOISONNEMENT AU MONOXYDE DE CARBONE**

Le non-respect des consignes suivantes portant sur chacun des appareils raccordés au système d'évacuation mis en service pourrait entraîner l'empoisonnement au monoxyde de carbone ou la mort. Les consignes suivantes doivent être observées pour chaque appareil raccordé au système d'évacuation mis en service si les autres appareils raccordés au système ne sont pas en service:

1. Sceller toute ouverture non utilisée de la système d'évacuation;
2. S'assurer que la système d'évacuation présente des dimensions et une pente horizontale conformes à la norme ANSI Z223.1/NFPA 54, intitulée National Fuel Gas Code ou aux codes d'installation CSA-B149.1, ainsi qu'aux présentes instructions. S'assurer que la système d'évacuation n'est pas bloquée, restreinte, corrodée, qu'elle ne fuit pas et qu'elle ne présente aucun autre défaut potentiellement dangereux;
3. Dans la mesure du possible, fermer toutes les portes et fenêtres du bâtiment, et toutes les portes entre la pièce où se trouve l'appareil raccordé à la système d'évacuation et les autres pièces du bâtiment.
4. Fermer les registres des foyers;
5. Mettre en service les sècheuses et tout autre appareil qui n'est pas raccordé à la système d'évacuation. Faire fonctionner à régime maximal tout ventilateur d'évacuation, tel que les hottes de cuisinière et les ventilateurs de salles de bains. Ne pas mettre en service les ventilateurs d'été.
6. Respecter les instructions d'allumage. Mettre en service l'appareil à l'essai. Régler le thermostat de manière à ce que l'appareil fonctionne sans interruption;
7. Vérifier s'il y a débordement à l'orifice d'évacuation du coupe tirage des appareils dotés d'un coupe tirage 5 minutes après l'allumage du brûleur principal. Utiliser la flamme d'une allumette ou d'une chandelle.
8. Si l'on constate, au cours de l'un des essais qui précèdent, que l'évacuation est déficiente, corriger le système d'évacuation conformément à la norme ANSI Z223.1/NFPA 54, National Fuel Gas Code, et (ou) aux codes d'installation CSA B149.1.
9. Après avoir déterminé que tous les appareils raccordés à la système d'évacuation évacuent correctement tel que prescrit ci-dessus, rouvrir les portes et les fenêtres et remettre les ventilateurs d'évacuation, les registres de foyers et tout autre appareil fonctionnant au gaz à leur état de fonctionnement initial.

## Important Information

- This furnace must be vented in compliance with the current revision of the National Fuel Gas Code (ANSI-Z223.1/NFPA54). Instructions for determining the adequacy of an installation can be found in the current revision of the NFGC (ANSI Z223.1/NFPA54). Consult local codes for special requirements. These requirements are for US installations as found in the NFGC.
- Furnace installation using methods other than those described in the following sections must comply with the National Fuel Gas Code (NFGC) and all applicable local codes.
- Requirements in Canada (B149.1) are structured differently. In Canada, venting shall conform to the requirements of the current (CAN/CGA B149.1 or .2) installation codes. Consult local codes for special requirements.
- Provisions must be made during the installation of this furnace that provide an adequate supply of air for combustion. The combustion air from the outside needs to be clear of chemicals that can cause corrosion. The inlet pipe should not be placed near corrosive chemicals such as those listed on page 5.

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### **WARNING:**

Upon completion of the furnace installation, carefully inspect the entire flue system both inside and outside the furnace to assure it is properly sealed. Leaks in the flue system can result in serious personal injury or death due to exposure of flue products, including carbon monoxide.

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### **WARNING:**

This furnace must not be vented with other appliances, even if that appliance is of the condensing type. Common venting can result in severe corrosion of other appliances or their venting and can allow combustion gases to escape through such appliances or vents. Do not vent the furnace to a fireplace chimney or building chase.

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This condensing furnace is certified for installation either as a Direct Vent (2-pipe) or Conventional (1-pipe) appliance. Direct Vent appliances draw combustion air from the outdoors and vent combustion products back outside. Installation with air taken from around the furnace is often referred to as Conventional installation - i.e. only the vent (exhaust) pipe is provided.

Another important consideration when selecting one or two pipe installation is the quality of the indoor air which can sometimes be contaminated with various household chemicals. These chemicals can cause severe corrosion in the furnace combustion system. A 2-pipe installation has the additional advantage that it isolates the system from the effects of negative pressure in the house.

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### **CAUTION:**

Exhaust fans, clothes dryers, fireplaces and other appliances that force air from the house to the outdoors can create a negative pressure inside the house, resulting in improper furnace operation or unsafe conditions such as flame roll out. It is imperative that sufficient air exchange with the outdoors is provided to prevent depressurization. Additional information about how to test for negative pressure problems can be found in the National Fuel Gas Code.

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Air openings on top of the furnace, in closet doors or through walls must never be restricted. If the furnace is operated without adequate air for combustion, the flame roll-out switch will open, turning off the gas supply to the burners. This safety device is a manually reset switch. **DO NOT install jumper wires across these switches to defeat their function or reset a switch without identifying and correcting the fault condition.** If a switch must be replaced, use only the correct sized part specified in the Replacement Parts List provided online.

#### **Direct Vent Furnaces**

Direct Vent (2-pipe) furnaces draw combustion air directly from the outdoors and then vent the combustion products back outside, isolating the entire system from the indoor space. It is important to make sure that the whole system is sealed and clearances to combustibles are maintained regardless of the installation being in a confined or unconfined space.

#### **Conventional Vent Systems - Confined Spaces**

A confined space is an area with volume less than 50 cubic feet per 1,000 Btuh of the combined input rates of all appliances drawing combustion air from that space. Furnace closets, small equipment rooms and garages are confined spaces. Furnaces installed in a confined space which supply heated air to areas outside the space must draw return air from outside the space and must have the return air ducts tightly sealed to the furnace. Ducts must have cross-sectional area at least as large as the free area of their respective openings to the furnace space. Attics or crawl spaces must connect freely with the outdoors if they are the source of air for combustion and ventilation.

The required sizing of these openings is determined by whether inside or outside air is used to support combustion, the method by which the air is brought to the space, and



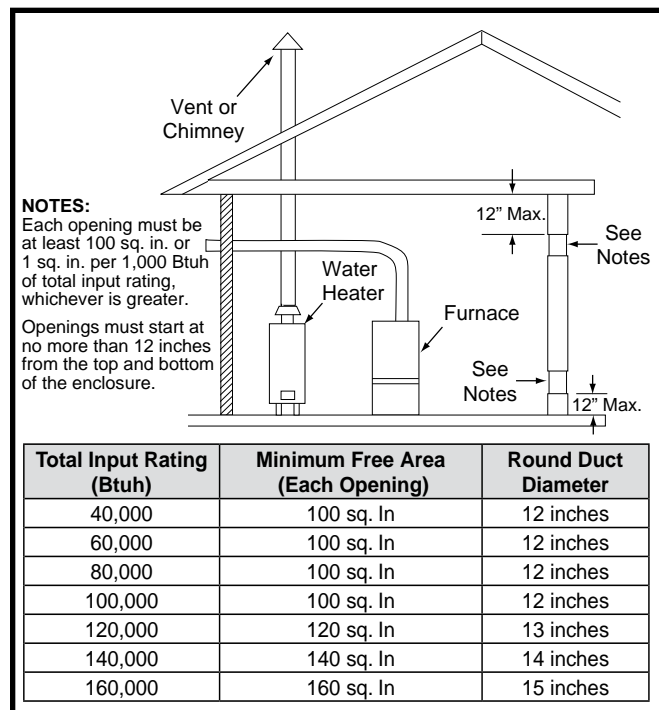
by the total input rate of all appliances in the space. In all cases, the minimum dimension of any combustion air opening is 3 inches.

### Air From Inside

If combustion air is taken from the heated space, the two openings must each have a free area of at least one square inch per 1,000 Btuh of total input of all appliances in the confined space, but **not less than** 100 square inches of free area. See example and Figure 2.

#### **Example:**

If the combined input rate of all appliances is less than or equal to 100,000 Btuh, each opening must have a free area of at least 100 square inches. If the combined input rate of all appliances is 120,000 Btuh, each opening must have a free area of at least 120 square inches.



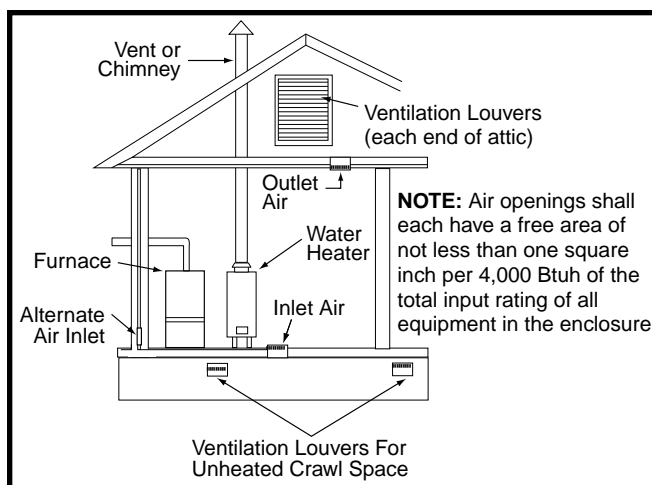
**Figure 2. Combustion Air Drawn from Inside**

### Outdoor Air from a Crawl Space or Vented Attic

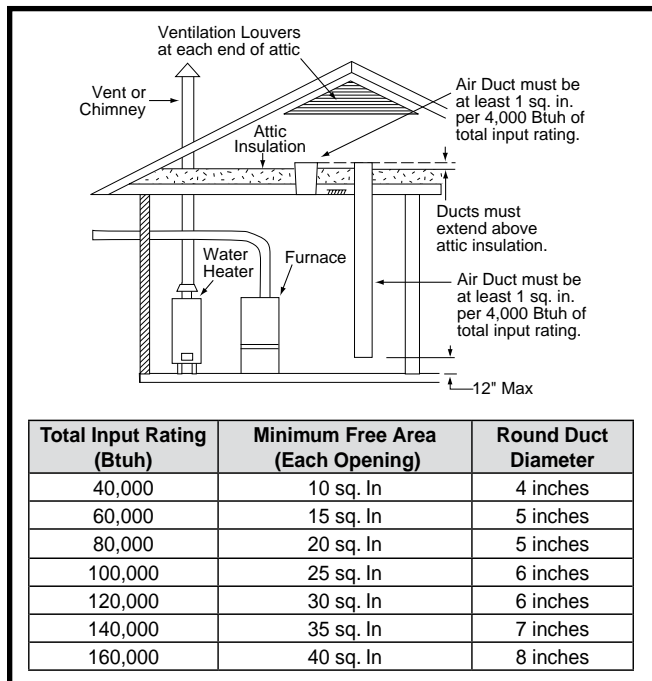
When the openings can freely exchange air with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 Btuh of total appliance input. The openings shall exchange directly, or by ducts, with the outdoor spaces (crawl or attic) that freely exchange with the outdoors (Figure 3).

### Outdoor Air Using Vertical Ducts

If combustion air is taken from outdoors through vertical ducts, the openings and ducts must have a minimum free area of one square inch per 4,000 Btuh of total appliance input (Figure 4).



**Figure 3. Combustion Air Drawn from a Crawl Space or Vented Attic**



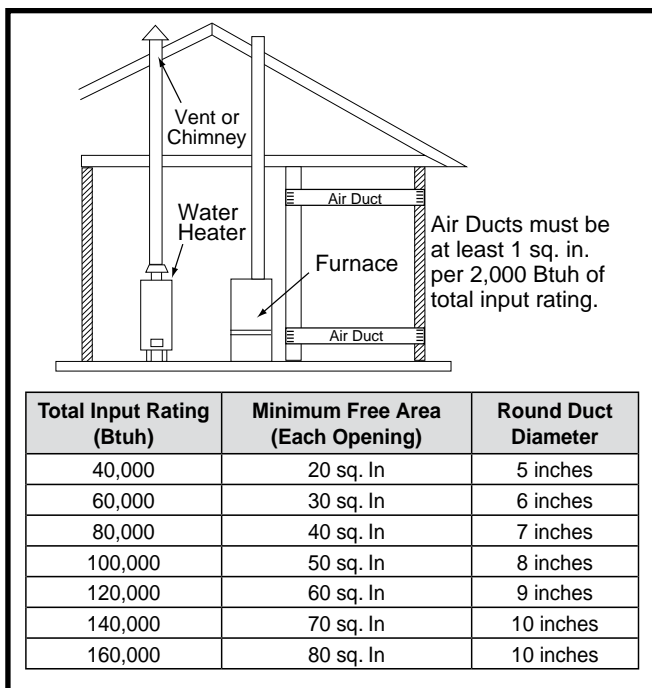
**Figure 4. Combustion Air Drawn from Outside Through Vertical Ducts**

### Outdoor Air Using Horizontal Ducts

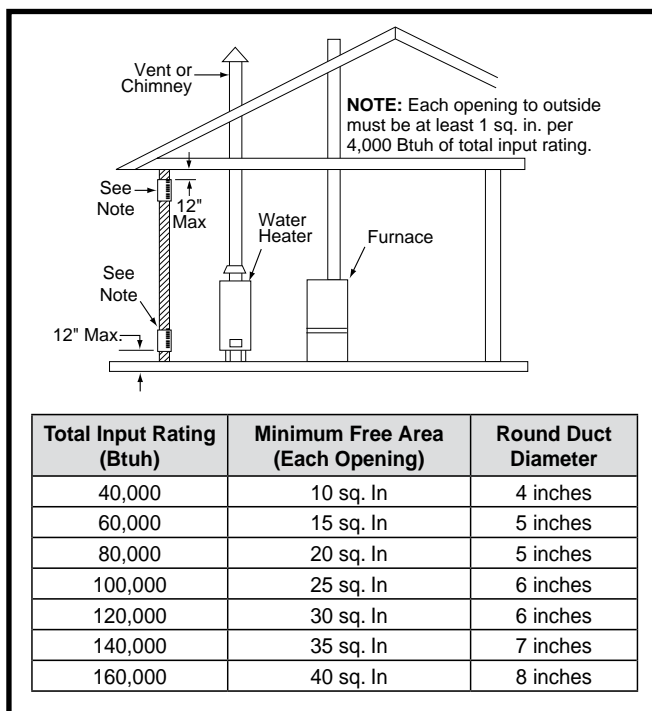
If combustion air is taken from outdoors through horizontal ducts, the openings and ducts must have a minimum free area of one square inch per 2,000 Btuh of total appliance input. Ducts must have cross-sectional area at least as large as the free area of their respective openings to the furnace space. See Figure 5 (page 10).

### Air Directly Through an Exterior Wall

If combustion air is provided directly through an exterior wall, the two openings must each have free area of at least one square inch per 4,000 Btuh of total appliance input. See Figure 6 (page 10).



**Figure 5. Combustion Air Drawn from Outside Through Horizontal Ducts**



**Figure 6. Combustion Air Drawn from Outside Through an Exterior Wall**

**Example:**

A space with a water heater rated at 45,000 Btuh input and a furnace rated at 75,000 Btuh requires a volume of 6,000 cubic feet [ $50 \times (45 + 75) = 6,000$ ] to be considered unconfined. If the space has an 8 foot ceiling, the floor area of the space must be 750 sq. ft. ( $6,000 / 8 = 750$ ).

**Alternate Method of Providing Air from Outside:**

If acceptable under local Codes, it is permitted to provide outside air using one opening (See NFGC). Generally, confined spaces must have 2 openings in the space for combustion air. One opening must be within 12 inches of the ceiling, and the other must be within 12 inches of the floor. However, an alternative method recently adopted by the NFGC uses one opening within 12 inches of the top of the space. This method may be used if it is acceptable to the local codes.

**The following conditions must be met:**

1. The opening must start within 12" of the top of the structure and connect with the out of doors through vertical or horizontal ducts or be ducted to a crawl or attic space that connects with the out of doors.
2. The opening must have a minimum free area of 1 in<sup>2</sup>. per 3,000 Btu per hour of the total input rating of all equipment located in the enclosure.
3. The free area must not be less than the sum of all the areas of the vent connectors in the enclosure.

**Conventional Vent Systems - Installation In An Unconfined Space**

An unconfined space is an area including all rooms not separated by doors with a volume greater than 50 cubic feet per 1,000 Btuh of the combined input rates of all appliances which draw combustion air from that space.

In general, a furnace installed in an unconfined space will not require outside air for combustion. However, in homes built for energy efficiency (low air change rates), it may be necessary to provide outside air to ensure adequate combustion and venting, even though the furnace is located in an unconfined space. See example below.

**Category IV Venting**

**⚠ WARNING:**

**Upon completion of the furnace installation, carefully inspect the entire flue system both inside and outside the furnace to assure it is properly sealed. Leaks in the flue system can result in serious personal injury or death due to exposure of flue products, including carbon monoxide.**

This furnace is classified as a *Category IV* appliance, which requires special venting materials and installation procedures. This section specifies installation requirements for Conventional (1-pipe) and Direct Vent (2-pipe) piping.

For 1- pipe installations, install vent piping as described in this section and provide air for combustion and ventilation according to pages 7 - 10. The maximum length of vent and combustion air piping for either type of installation is listed in Table 1 (page 11).

Category IV appliances operate with positive vent pressure and therefore require vent systems which are thoroughly sealed. They also produce liquid condensate, which is slightly acidic and can cause severe corrosion of ordinary venting materials. Furnace operation can be adversely affected by restrictive vent and combustion air piping.

The inducer assembly on this furnace can be rotated to vent the flue products out of the left or right side of the furnace. This increases the flexibility of which direction the vent pipe can exit the furnace.

### Vent Pipe Material

Vent and combustion air pipe and fittings must be one of the following materials in the list and must conform to the indicated ANSI/ASTM standards. Cement must conform to ASTM Standard D2564 for PVC and Standard D2235 for ABS. PVC primer must meet standard ASTM F656. When joining PVC piping to ABS, use PVC solvent cement (See procedure specified in ASTM Standard D3138).

In Canada, all plastic vent pipes and fittings including any cement, cleaners, or primers must be certified as a system to ULC S636. However this requirement does not apply to the finish flanges or piping internal to the furnace.

Materials	Standards
Schedule 40PVC .....	D1785
PVC-DWV .....	D2665
SDR-21 & SDR-26.....	D2241
ABS-DWV .....	D2661
Schedule 40 ABS.....	F628
Foam/Cellular Core PVC .....	F891

### Vent Pipe Length & Diameter

In order for the furnace to operate properly, the combustion air and vent piping must not be excessively restrictive.

- The venting system should be designed to have the minimum number of elbows or turns.
- All horizontal runs must slope upwards from the furnace at 1/4 inch minimum per running foot of vent.
- Transition to the final vent diameter should be done as close to the furnace outlet as practical.
- Always use the same size or a larger pipe for combustion air that is used for the exhaust vent.

Table 1 indicates the maximum allowable pipe length for a furnace of known input rate, when installed with piping of selected diameter and number of elbows. To use the table, the furnace input rate, the centerline length and the number of elbows on each pipe must be known.

When estimating the length of vent runs, consideration must be made to the effect of elbows and other fittings. This is conveniently handled using the idea of *equivalent length*. This means the fittings are assigned a linear length that accounts for the pressure drop they will cause. For example: a 2" diameter, long radius elbow is worth the equivalent of 2.5 feet of linear run. A 90 degree tee is worth 7 ft.

The equivalent lengths of tees and various elbows are listed in Table 1. Measure the linear length of the vent run and then add in the equivalent length of each fitting. The total length, including the equivalent fitting lengths, must be less than the maximum length specified in the table.

Condensing furnace combustion products have very little buoyancy, so Table 1 is to be used without consideration of any vertical rise in the piping.

FURNACE MODELS (BTU)	FURNACE INSTALLATION	SINGLE VENT PIPE LENGTH (FT.) with 1 long radius elbow*		DUAL VENT PIPE LENGTH (ft.) with 1 long radius elbow on each pipe*	
		OUTLET 2" Diameter	OUTLET 3" Diameter	INLET/OUTLET 2" Diameter	INLET/OUTLET 3" Diameter
60,000	Upflow	50	80	50	80
	Horizontal	40	80	40	80
80,000	Upflow	60	90	60	90
	Horizontal	50	90	50	90
100,000	Upflow	50	90	50	90
	Horizontal	40	90	40	90
120,000	Upflow	N/A	90	N/A	90
	Horizontal	N/A	70	N/A	70

#### **\*NOTES:**

- 1 Subtract 2.5 ft. for each additional 2 inch long radius elbow, 5 ft. for each additional 2 inch short radius elbow, 3.5 ft. for each additional 3 inch long radius elbow, and 7 ft. for each additional 3 inch short radius elbow. Two 45° elbows are equivalent to one 90° elbow.
2. Subtract 5ft for each 2" tee and 8ft for each 3" tee.
3. This table applies for elevations from sea level to 2,000 ft. For higher elevations, decrease pipe lengths by 8% per 1,000 ft of altitude.
4. The minimum length for 2" or 3" diameter vent pipe is 5 ft.

**Table 1. Vent Pipe Lengths**

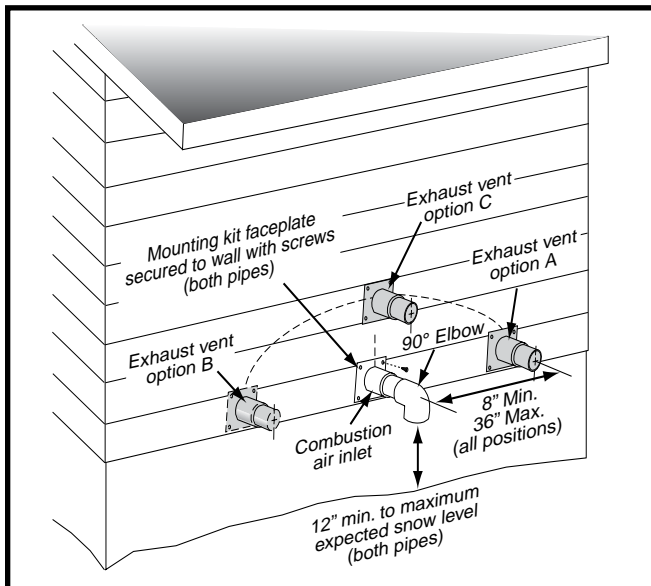
## Vent Pipe Installation

### **CAUTION:**

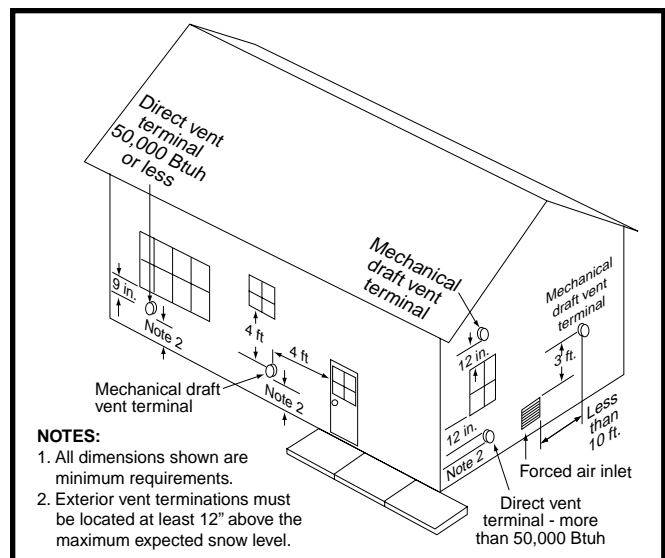
**Combustion air must not be drawn from a corrosive atmosphere.**

This furnace has been certified for installation with zero clearance between vent piping and combustible surfaces. However, it is good practice to allow space for convenience in installation and service.

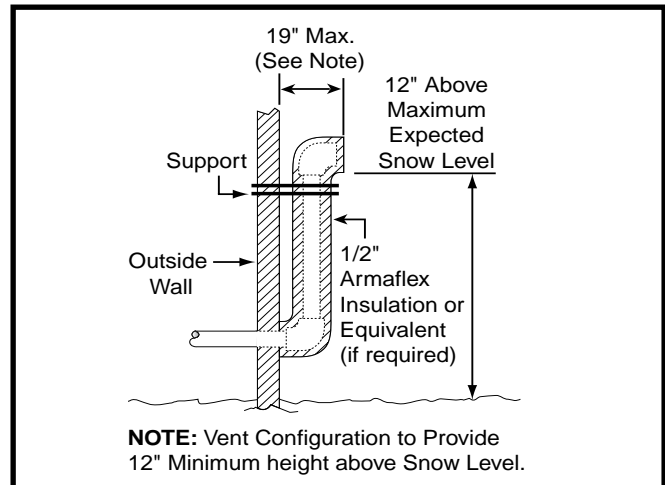
- The quality of outdoor air must be considered. Make sure the combustion air intake is not located near a source of solvent fumes or other chemicals which can cause corrosion of the furnace combustion system. (See list of substances on page 5).
- Route piping as direct as possible between the furnace and the outdoors. Longer vent runs require larger diameters. Vent piping must be sloped upwards 1/4" per foot in the direction from the furnace to the terminal. This is to ensure that any condensate flows back to the condensate disposal system.
- If a Direct Vent (2-pipe) system is used, the combustion air intake and the vent exhaust must be located in the same atmospheric pressure zone. This means both pipes must exit the building through the same portion of exterior wall or roof as shown in Figures 7 - 10 and Figure 29 (page 38).
- Piping must be mechanically supported so that its weight does not bear on the furnace. Pipe supports must be installed a minimum of every 5 feet along the vent run to ensure no displacement after installation. Supports may be at shorter intervals if necessary to ensure that there are no sagging sections that can trap condensate. It is recommended to install couplings along the vent pipe, on either side of the exterior wall (Figure 29). These couplings may be required by local code.



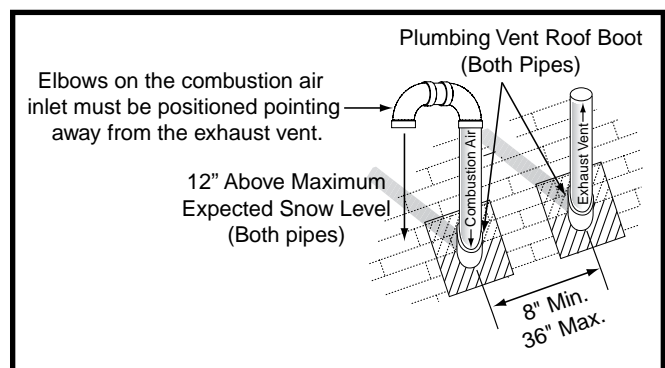
**Figure 7. Inlet & Exhaust Pipe Clearances**



**Figure 8. Vent Locations**



**Figure 9. Alternate Horizontal Vent Installation**



**Figure 10. Vertical Vent Termination**

- If breakable connections are required in the combustion air inlet pipe (if present) and exhaust vent piping, then straight neoprene couplings for 2" or 3" piping with hose clamps can be used. These couplings can be ordered through your local furnace distributor. To install a coupling:

1. Slide the rubber coupling over the end of the pipe that is attached to the furnace and secure it with one of the hose clamps.
2. Slide the other end of the rubber coupling onto the other pipe from the vent.
3. Secure the coupling with the second hose clamp, ensuring that the connection is tight and leak free.

### Outdoor Terminations - Horizontal Venting

Vent and combustion air intake terminations shall be installed as depicted in Figures 7 & 8 (page 12) and in accordance with these instructions:

- Vent termination clearances must be consistent with the NFPA, ANSI 2223.1/NFPA 54 and/or the CSA B149.1, Natural Gas and Propane Installation Code. Table 11 (page 35) lists the necessary distances from the vent termination to windows and building air intakes.
- All minimum clearances must be maintained to protect building materials from degradation by flue gases as shown in Figure 8 (page 12).
- Vent and combustion air intake terminations must be located to ensure proper furnace operation and conformance to applicable codes. A vent terminal must be located at least 3 feet above any forced air inlet located within 10 feet. This does not apply to the combustion air inlet of a direct vent (two pipe) appliance. In Canada, CSA B149.1, takes precedence over these instructions. See Table 11 (page 35).
- For optimal performance, vent the furnace through a wall that experiences the least exposure to winter winds.
- The vent termination shall be located at least 3 ft. horizontally from any electric meter, gas meter, regulator and any relief equipment. These distances apply ONLY to U.S. installations. In Canada, CSA B149.1, takes precedence over these instructions.
- Do not install the vent terminal such that exhaust is directed into window wells, stairwells, under decks or into alcoves or similar recessed areas, and do not terminate above any public walkways.
- If venting horizontally, a side wall vent kit is available according to the pipe diameter size of the installation. For 2 inch pipe use side wall vent kit #904617, and for 3 inch pipe use kit #904347. **Please follow the instructions provided with the kit.**
- Concentric vent termination kits are available for use with these furnaces. For 2 Inch pipe use kit #904952 and for 3 inch pipe use kit # 904953. **Please follow the instructions provided with the kit.**
- When the vent pipe must exit an exterior wall close to the grade or expected snow level where it is not possible to obtain clearances shown in Figure 7, a riser may

be used as shown in Figure 9. Insulation is required to prevent freezing of this section of pipe. See Vent Freezing Protection Section.

### Outdoor Terminations - Vertical Venting

Termination spacing requirements from the roof and from each other are shown in Figure 9. The roof penetration must be properly flashed and waterproofed with a plumbing roof boot or equivalent flashing. Vent and combustion air piping may be installed in an existing chimney which is not in use provided that:

- Both the exhaust vent and air intake run the length of the chimney.
- The top of the chimney is sealed and weatherproofed.
- The termination clearances shown in Figure 10 (page 12) are maintained.
- No other gas fired or fuel-burning equipment is vented through the chimney.

### Vent Freezing Protection

## **CAUTION:**

**When the vent pipe is exposed to temperatures below freezing (i.e., when it passes through unheated spaces, chimneys, etc.) the pipe must be insulated with 1/2 inch thick sponge rubber insulation, Armaflex-type insulation or equivalent. Insulating pipe is important to avoid condensate icing.**

- Table 2 (page 14) lists the maximum length of flue pipe that can travel through an unconditioned space or an exterior space. The total vent length must not exceed the lengths noted in Table 1 (page 11). For Canadian installations, please refer to the Canadian Installation Code (CAN/CGA-B149.1 or 2) and/or local codes.
- For extremely cold climates or for conditions of short furnace cycles (i.e. set back thermostat conditions) the last 18 inches of vent pipe can be reduced. It is acceptable to reduce from 3" to 2-1/2", 3" to 2", or 2" to 1-1/2" if the total vent length is at least 15 feet in length, and the vent length is within the parameters specified in Table 1. The restriction should be counted as 3 equivalent feet. Smaller vent pipes are less susceptible to freezing, but must not be excessively restrictive. The length of the 2 inch pipe must not be longer than 18 inches.
- To prevent debris or creatures from entering the combustion system, a protective screen may be installed over the combustion air intake opening. The screens hole size must be large enough to prevent air restriction.



Winter Design Temperature	Maximum Flue Pipe Length (FEET) in Unconditioned & Exterior Spaces	
	Without Insulation	With Insulation*
20	45	70
0	20	70
-20	10	60

\*NOTE: Insulation thickness greater than 3/8 inch, based on an R value of 3.5 (ft x F x hr) / (BTU x in.)

**Table 2. Vent Protection**

### Existing Installations

When an existing furnace is removed from a vent system serving other appliances, the existing vent system may not be sized properly to vent the remaining appliances (For example: water heater). An improperly sized venting system can result in the formation of condensate, leakage, or spillage. The existing vent system should be checked to make sure it is in compliance with the NFGC and must be brought into compliance before installing the furnace.

**NOTE:** If replacing an existing furnace, it is possible you will encounter an existing plastic venting system that is subject to a Consumer Product Safety Commission recall. The pipes involved in the recall are High Temperature Plastic Vent (HTPV). **If your venting system contains these pipes DO NOT reuse this venting system!** This recall does not apply to other plastic vent pipes, such as white PVC or CPVC. Check for details on the CPSC website or call their toll-free number (800) 758-3688.

### Condensate Disposal

The method for disposing of condensate varies according to local codes. Consult your local code or authority having jurisdiction.

Each of the condensate drain lines must be J-trapped using field supplied parts. After the condensate lines are J-trapped, they may be combined together into a single run to the drain. The drain lines must be routed downward to ensure proper drainage from furnace.

Neutralizer kit P/N 902377 is available for use with this furnace. **Please follow the instructions provided with the kit.**

## CIRCULATING AIR REQUIREMENTS

### **WARNING:**

**Do not allow combustion products to enter the circulating air supply. Failure to prevent the circulation of combustion products into the living space can create potentially hazardous conditions including carbon monoxide poisoning that could result in personal injury or death.**

**All return ductwork must be secured to the furnace with sheet metal screws. For installations in confined spaces, all return ductwork must be adequately sealed. When return air is provided through the bottom of the furnace, the joint between the furnace and the return air plenum must be air tight.**

**The surface that the furnace is mounted on must provide sound physical support of the furnace with no gaps, cracks or sagging between the furnace and the floor or platform.**

**Return air and circulating air ductwork must not be connected to any other heat producing device such as a fireplace insert, stove, etc. This may result in fire, explosion, carbon monoxide poisoning, personal injury, or property damage.**

### Plenums & Air Ducts

- Plenums and air ducts must be installed in accordance with the Standard for the Installation of Air Conditioning and Ventilating Systems (NFPA No. 90A) or the Standard for the Installation of Warm Air Heating and Air Conditioning Systems (NFPA No. 90B).
- Table 7 (page 31) lists the High and Low target CFMs for each maximum input rate and temperature rise. If the maximum airflow is greater than 1,600 cfm, two returns are recommended. **NOTE:** The motor speed of \*MQ furnaces cannot be changed manually by resetting the dipswitches on the motor control board.
- It is recommended that the outlet duct contain a removable access panel. The opening should be accessible when the furnace is installed in service and shall be of a size that smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heat exchanger. The cover for the opening shall be attached in such a way as to prevent leaks.
- If outside air is used as return air to the furnace for ventilation or to improve indoor air quality, the system must be designed so that the return air is not less than 60° F (15° C) during operation. If a combination of indoor and outdoor air is used, the ducts and damper system must be designed so that the return air supply to the furnace is equal to the return air supply under normal, indoor return air applications.

- When a cooling system is installed which uses the furnace blower to provide airflow over the indoor coil, the coil must be installed downstream (on the outlet side) of the furnace or in parallel with the furnace.
- If a cooling system is installed in parallel with the furnace, a damper must be installed to prevent chilled air from entering the furnace and condensing on the heat exchanger. If a manually operated damper is installed, it must be designed so that operation of the furnace is prevented when the damper is in the cooling position and operation of the cooling system is prevented when the damper is in the heating position.
- It is good practice to seal all connections and joints with industrial grade sealing tape or liquid sealant. Requirements for sealing ductwork vary from region to region. Consult with local codes for requirements specific to your area.

### Return Air Connections

- In applications where the supply ducts carry heated air to areas outside the space where the furnace is installed, the return air must be delivered to the furnace by duct(s) secured to the furnace casing, running full size and without interruption. **Do not use the back of the furnace for return air.**
- Position the furnace with the return air ductwork ensuring even alignment of furnace (or coil casing) air opening and return air duct. **NOTE:** The ductwork must have an opening equal to that of the return air opening of the furnace (or coil casing). See Figure 23 (page 31) for return air opening size.

### Upflow & Horizontal Furnaces

- The return air ductwork may be connected to the left side, right side, or bottom of the furnace. **NOTE:** If using the left or right side of the furnace for return air, the bottom panel (Figure 29) must not be removed from the bottom of the furnace.

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## WARNING:

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**The bottom panel of the furnace must be in place when the furnace is installed with side return air ducts. Removal of all or part of the base could cause circulation of combustible products into the living space and create potentially hazardous conditions, including carbon monoxide poisoning that could result in personal injury or death.**

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- **Side Return Installations:** To attach the return air duct to the left or right side of the furnace, punch out the 4 knockouts from the side of the furnace (Figure 23, page 31). Using sharp metal cutters, cut an opening between all 4 knockouts to expose the blower assembly. Position the return air duct over the opening and secure to the side with sheet metal screws.

- **Bottom Return Installations:** If using the bottom of the furnace for return air, the bottom panel (Figure 23) must be removed from the bottom of the furnace. See page 17 for removal instructions. Position the furnace over the return air duct and secure together with sheet metal screws. Make sure the screws penetrate the duct and furnace casing.

### Downflow Furnaces

- To attach the return air duct to the downflow furnace, bend the flanges on the furnace upward 90° with wide duct pliers. See Figure 23 (page 31) for furnace flange locations. **NOTE:** If system installation includes AC coil casing, bend the flanges on the coil casing upward 90° before attaching the return air duct.
- Secure the return air ductwork to the furnace or coil casing (if installed) with sheet metal screws. Make sure the screws penetrate the sheet metal casing and flanges.

### Supply Air Connections

- The supply air must be delivered to the heated space by duct(s) secured to the furnace or coil box casing, running full size and without interruption.
- To attach the supply air duct to upflow & horizontal furnaces, bend the flanges on the furnace upward 90° with wide duct pliers. See Figure 23 (page 31) for furnace flange locations. **NOTE:** If system installation includes AC coil casing, bend the flanges on the coil casing upward 90° before attaching the supply air duct.
- Position the supply air ductwork onto the furnace ensuring even alignment of furnace air opening and supply air duct. **NOTE:** The ductwork must have an opening equal to that of the supply air opening of the furnace. See Figure 23 for supply air opening size.

### Acoustical Treatments

Damping ducts, flexible vibration isolators, or pleated media-style filters on the return air inlet of the furnace may be used to reduce the transmission of equipment noise emanating from the furnace. These treatments can produce a quieter installation, particularly in the heated space. However, they can increase the pressure drop in the duct system. Care must be taken to maintain the proper maximum pressure rise across the furnace, temperature rise and flow rate. This may mean increasing the duct size and/or reducing the blower speed. These treatments must be constructed and installed in accordance with NFPA and SMACNA construction standards. Consult with local codes for special requirements. For best sound performance, be sure to install all the needed gaskets and grommets around penetrations into the furnace, such as for electrical wiring

## FURNACE INSTALLATION

\*MQ series gas furnaces may be installed in the upflow or horizontal right or left positions with either right, left, or upflow return air.

### General Requirements

- The furnace must be leveled at installation and attached to a properly installed duct system. See Table 1 (page 6) for the required clearances needed to move the furnace to its installation point (hallways, doorways, stairs, etc).
- The furnace must be installed so that all electrical components are protected from water.
- The furnace must be installed upstream from a refrigeration system. (If applicable)
- The cabinet plug must always be used to close the hole in the side of the furnace when rotating the inducer.
- The furnace requires special venting materials and installation procedures. See pages 10 -14 for venting guidelines and specifications.

### Upflow Installation

#### **WARNING:**

**The furnace must not be installed directly on carpeting, tile, or any combustible material other than wood flooring.**

\*MQ series gas furnaces are shipped with the bottom panel installed as shown in Figure 23. If the furnace is installed with side return air, the bottom panel must not be removed. If the furnace is installed with bottom return air, the bottom panel must be removed. See Bottom Panel Removal on page 18.

### Horizontal Installation

#### **WARNING:**

**The \*MQ series gas furnace must not be installed directly on carpeting, tile, or any combustible material other than wood flooring.**

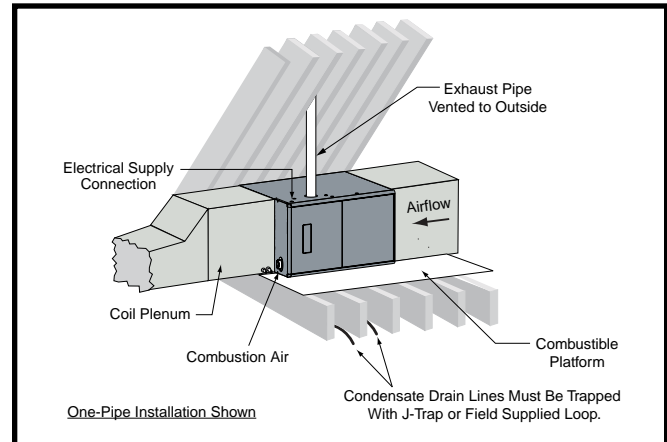
The \*MQ series gas furnace can be installed horizontally in an attic, basement, crawl space or alcove (Figure 11). It can also be suspended from a ceiling in a basement or utility room in either a right to left airflow or left to right airflow as shown in Figure 12.

\*MQ series furnaces are shipped with the bottom panel installed. If furnace is installed horizontally, remove the bottom panel from the furnace before attaching the duct system. See Bottom Panel Removal (page 17).

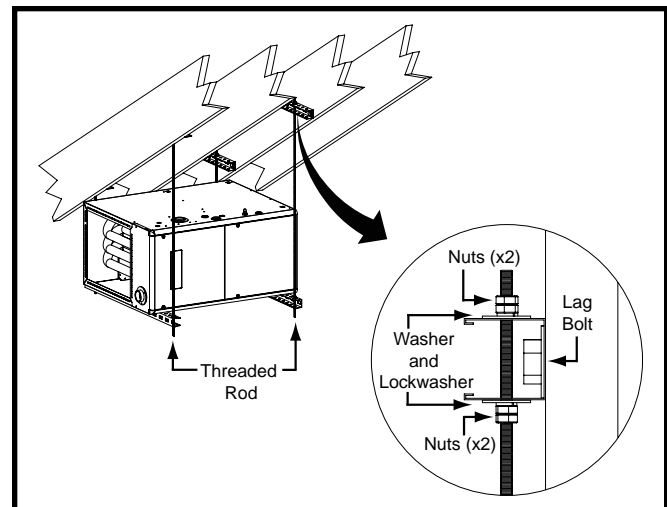
If installing the furnace in an attic, it is required that a drip pan be placed under the furnace. If the installation is on a combustible platform (Figure 11), it is recommended that the drip pan extend at least 12 inches past the top and front of the furnace.

If the furnace will be suspended from the ceiling, assemble a support frame (Figure 12) using slotted iron channel and full thread rod. Fasten the frame together with nuts, washers, and lockwashers. Secure the support frame to the rafters with lag bolts. The furnace can also be suspended using steel straps around each end of the furnace. The straps should be attached to the furnace with sheet metal screws and to the rafters with bolts.

It is recommended for further reduction of fire hazard that cement board or sheet metal be placed between the furnace and the combustible floor and extend 12 inches beyond the front of the door and top of the furnace.



**Figure 11. Horizontal installation on a Platform**



**Figure 12. \*MQ Suspended Horizontally**

### Bottom Panel Removal

The steps listed below describe how to remove the bottom panel from the furnace. See Figure 13 (page 17).

1. Remove the door (1) from the blower compartment.
2. Disconnect the wiring harness (2) from the furnace blower deck.
3. Remove two screws (3) securing the blower assembly (4) to the furnace.
4. Carefully pull the blower assembly (4) out thru the front of the furnace.



- Remove all screws (5) securing bottom panel (6) to bottom of furnace and front brace (7).
- Lift up and slide bottom panel (6) out through front of furnace.
- Reinstall the blower assembly (4) in reverse order.

#### Alternate Bottom Panel Removal

If the bottom panel cannot be removed using the previous instructions, the steps below are an alternate method for removing the bottom panel. See Figure 14.

- Remove the door (1) from the blower compartment
- Remove all screws securing the bottom panel (2) to the front brace (3).
- Remove two screws (4) securing the furnace cabinet to the blower deck (5).
- Remove all screws (6) securing the furnace cabinet to the bottom panel (2).
- Remove the screw (7) securing the bottom corner of the furnace cabinet to the front brace (3).
- Carefully spread the bottom corner of the furnace cabinet outwards while sliding the bottom panel (2) out through the front of the furnace.
- Reassemble the furnace in reverse order.

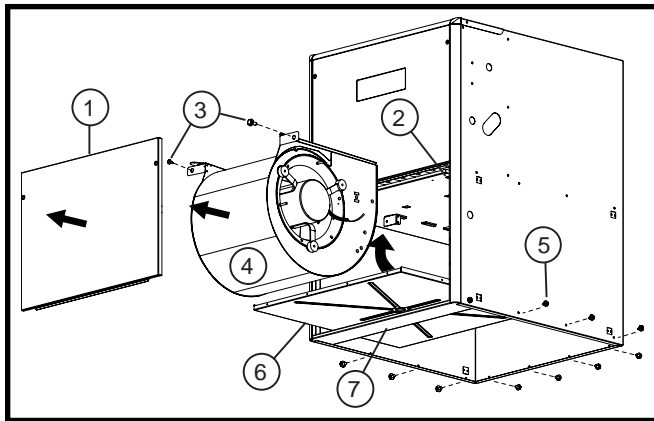


Figure 13. Bottom Panel Removal

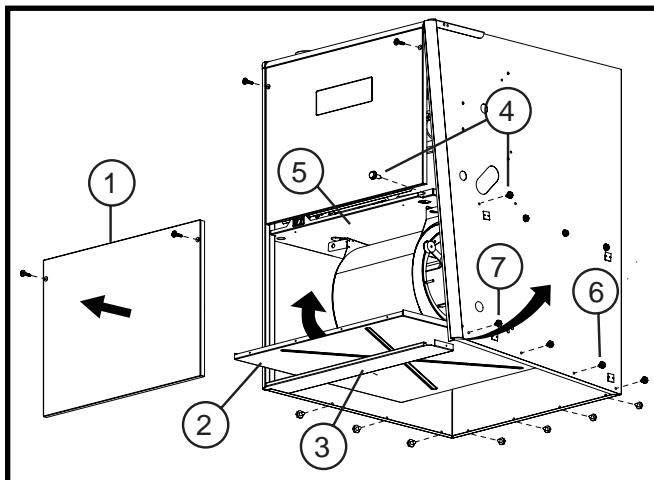


Figure 14. Alternate Removal Method

#### **Inducer & Venting Options**

To increase installation flexibility, the inducer assembly can be rotated to 2 different positions. Each variation has slightly different requirements with regard to condensate disposal and, in some cases, the need to seal the furnace cabinet.

**IMPORTANT NOTE:** The Inducer Assembly must never be positioned to vent downwards on horizontal installs.

Before using Table 3, the number of pipes (1-pipe or 2-pipe) connected to the furnace must be known. Find the proper furnace style (upflow or horizontal) and then the side that the pipes will exit from the furnace. Finally select the option that properly matches your installation type from Figures 27 & 28 (pages 36 & 37).

**NOTE:** It is important that Direct Vent (2-pipe) systems maintain an airtight flow path from the air inlet to the flue gas outlet. The \*MQ furnace is shipped from the factory with two holes in the cabinet for the flue gas outlet. In certain configurations, it is necessary to remove and relocate a plastic cap in the furnace cabinet. If changing the position of the flue gas outlet, it is required that the previous hole be closed off with the plastic cap to maintain air tightness in the furnace. The hole locations for \*MQ series upflow/horizontal furnaces are indicated in Figure 23 (page 31).

1 - PIPE INSTALLATIONS			
Vent	Upflow	Horizontal Right	Horizontal Left
Right	Option 1	N/A	Option 6
Left	Option 2	Option 5	N/A

2 - PIPE INSTALLATIONS			
Vent	Upflow	Horizontal Right	Horizontal Left
Right	Option 3	N/A	Option 8
Left	Option 4	Option 7	N/A

Table 3. Vent & Inducer Blower Options

#### Inducer Assembly Rotation



#### **WARNING:**

Inducer rotation must be completed before the furnace is connected to gas and electric. If both utilities have been connected, follow the shutdown procedures printed on the furnace label and disconnect the electrical supply.



#### **CAUTION:**

It is good practice to label all wires prior to disconnection. Wiring errors can cause improper and dangerous operation.

1. Disconnect both electrical harnesses from the inducer assembly.
2. Disconnect 2 wires from the inducer assembly limit switch.
3. Disconnect the pressure switch vacuum tube from the inducer assembly.
4. Remove 4 screws securing the inducer assembly to the header box.
5. Rotate the inducer assembly to its new position.  
**NOTE:** Verify the screw holes in the inducer assembly are aligned with the mounting holes in the header box.
6. Secure the inducer assembly to the header box by reinstalling the 4 screws.
7. Move the cabinet plug from side of furnace and reinstall in hole on opposite side of cabinet.
8. Reconnect the electrical harness to the inducer assembly.

### Accessories

The components in Figures 15 - 17 (page 19) are included in the extra parts bag that is supplied with the purchase of MQ furnaces. Depending on your particular installation, some of these components are optional and may not be used. Please refer to the descriptions and accompanying figures when installing these items.

### Finish Flange

The Finish Flange must be installed to vent the combustion air pipe through the top of the furnace. **NOTE:** For proper installation, it is important that the pipe and screw holes in the finish flange, gasket, and cabinet are aligned. See Figure 15.

1. Position flange gasket over hole in the furnace cabinet.
2. Position finish flange on top of the flange gasket with FRONT lettering nearest to the front of the furnace.
3. Secure flange and gasket to cabinet with three field supplied sheet metal screws.

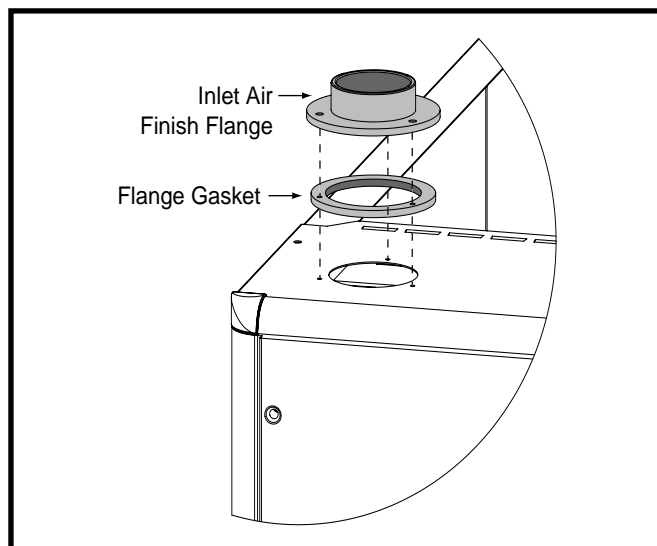


Figure 15. Finish Flange

### Rubber Grommets

The 2 1/4" rubber grommet is used to seal the opening between the furnace cabinet and the 2" PVC vent pipe. The rubber grommet should be installed in the 3" hole prior to running the vent pipe out of cabinet. No sealants are required. See Figure 16)

The 7/8" rubber grommet is used to seal the opening between the furnace cabinet and the gas pipe. The rubber grommet should be installed in the 1 5/8" hole prior to running the gas pipe into the cabinet. No sealants are required.

The 3/4" rubber grommet is used if venting out the left side of the cabinet and the drain tube is routed through the blower deck. Remove the plastic plug from the hole and install the grommet before routing the drain tube.

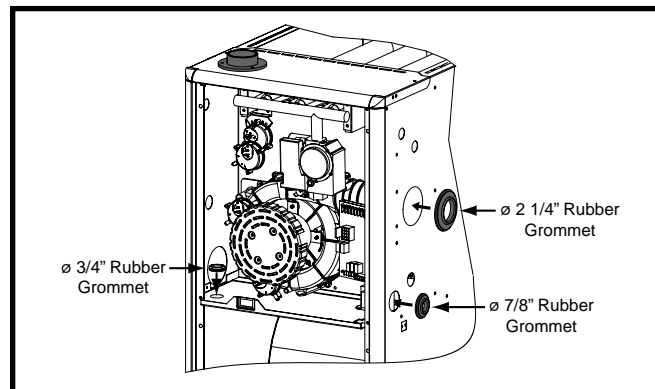


Figure 16. Rubber Grommets

### PVC Components

**IMPORTANT NOTE:** Before permanently installing these components, it is recommended you dry-fit them first to ensure proper fit and alignment with other vent pipes.

The 2" PVC Tee and Trap shown in Figure 17 (page 19) are used when the inducer is rotated to vent out thru the left or right side of the furnace cabinet.

The 1/2" x 3/4" hose barb can be used to route the condensate drain to the outside of the cabinet. It must be installed from inside the cabinet with the threaded end inserted thru the 1 1/16" hole. The condensate drain should be connected to the barbed end. Attach 1" PVC drain line to the threaded end.

### Typical Orientation

1. Install the PVC Tee vertically on the 2" vent pipe that is extending out the side of the cabinet. Permanently bond them together using appropriate primer and cement. Refer to the typical orientation shown in Figure 17.
2. Install the reducer or PVC trap (if supplied) on the bottom end of the PVC Tee. Permanently bond them together using appropriate primer and cement.
3. Install the 1/2" x 1/2" hose barb on the 2" PVC reducer.  
**NOTE:** Do not over tighten! Use an adequate amount of Teflon tape on the threads. Do not use liquid sealants.

4. Verify all connections and joints for tight fit and proper alignment with other vent pipes.

### Alternate Orientation

1. Install the 2" PVC Tee horizontally on the 2" vent pipe that is extending out the side of the cabinet. Permanently bond them together using appropriate primer and cement. Refer to the alternate orientation shown in Figure 17.
2. Install the 2" PVC Elbow on the end of the 2" PVC Tee. Permanently bond them together using appropriate primer and cement.
3. Install the reducer or PVC trap (if supplied) on the bottom end of the PVC Tee. Permanently bond them together using appropriate primer and cement.
4. Install the 1/2" x 1/2" hose barb on the 2" PVC reducer.  
**NOTE:** Do not over tighten! Use an adequate amount of Teflon tape on the threads. Do not use liquid sealants.
5. Verify all connections and joints for tight fit and proper alignment with other vent pipes.

### Condensate Drain Lines

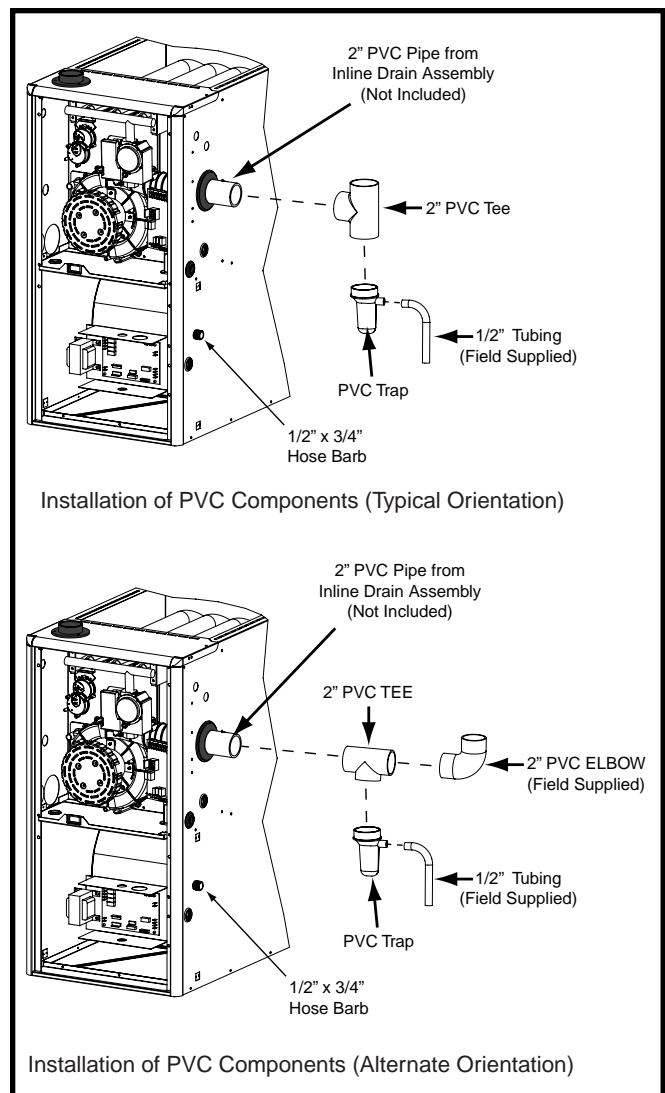
**IMPORTANT NOTE:** If the furnace is installed in an area where temperatures fall below freezing, special precautions must be made for insulating condensate drain lines that drain to the outdoors. If condensate freezes in the lines, this will cause improper operation or damage to the furnace. It is recommended that all drain lines on the outside of the residence be wrapped with an industry approved insulation or material allowed by local code.

The placement of the condensate drain lines will depend on the configuration selected in Table 3 (page 17). The drain lines can be routed out the left or right side of the furnace, but must maintain a downward slope to ensure proper condensate drainage.

The J-trap may need to be rotated to the side that matches your setup in Figures 27 - 28 (pages 36 - 37). To rotate the J-trap, loosen the clamp on the drain tube, rotate the J-trap to either side, and retighten the clamp.

#### Four general principles apply:

- Each condensate drain line must be separately trapped using a J-Trap or field supplied loop. After individually trapping the condensate lines, it is acceptable to combine the drains.
- There must always be a drain attached to the collector at the outlet of the secondary heat exchanger.
- There must always be a drain at the outlet of the inducer assembly.
- There must always be a drain at the lowest point of the venting system. **NOTE:** If using a condensate pump, the furnace drain line must be installed above the pumps water line.



**Figure 17. PVC Components**

#### Exceptions & clarifications to the general rules:

- In some cases, the lowest point in the vent system is where it connects to the inducer (Options 2 & 4). In this case one drain at this location is sufficient.
- If the vent exits the furnace horizontally, the vent may be turned vertically with a tee. The drip leg formed by the tee must include a drain (Options 1, 2, 3, & 4).
- In certain cases, it is permitted to drain the inducer back into the top drain of the collector (Options 1, 3, 5, & 7). More importantly, make sure this drain does not sag or become twisted in the middle. The drain tube supplied with the furnace may need to be trimmed.

## Pressure Switch Tubing

### **WARNING:**

#### **ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD**

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

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

Before servicing, disconnect all electrical power to furnace.

### **AVERTISSEMENT:**

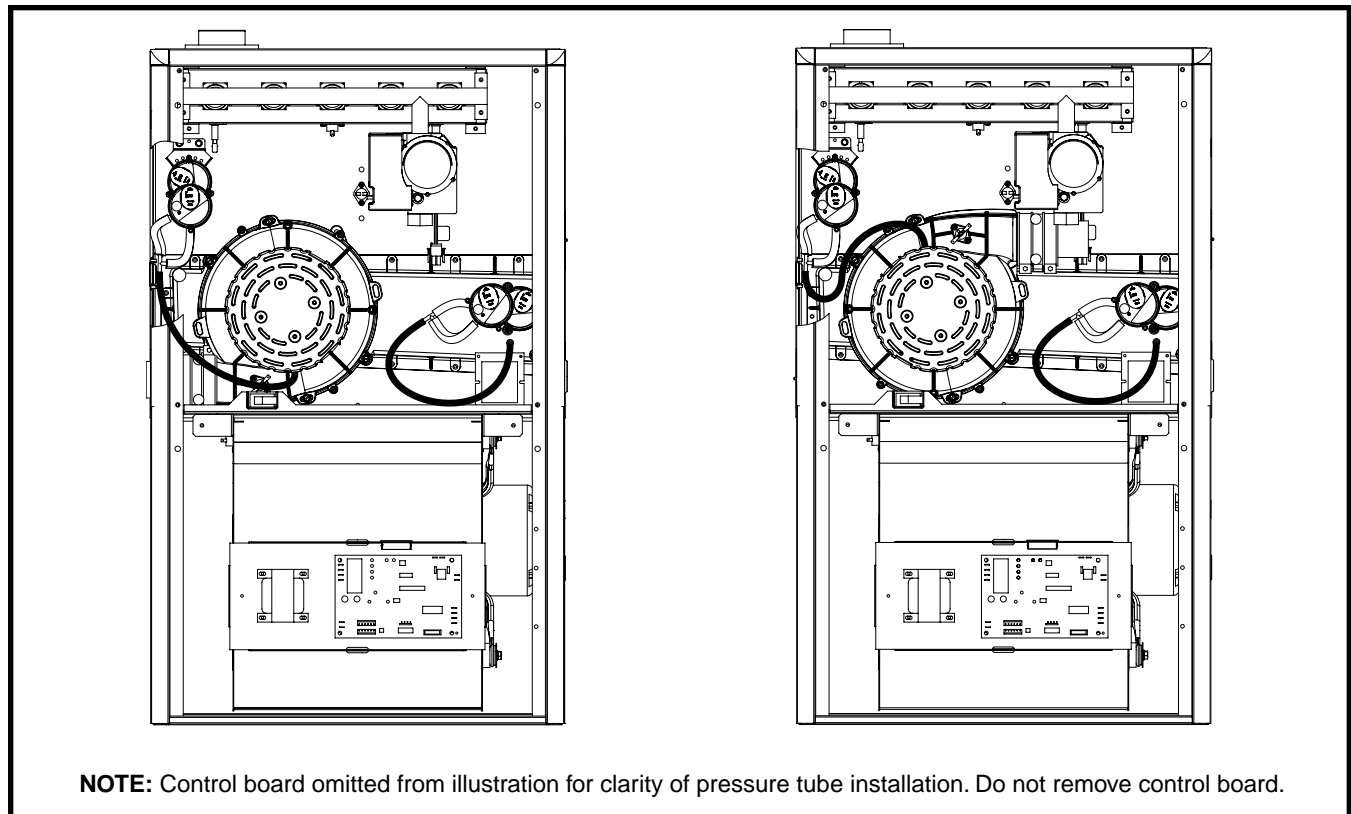
#### **RISQUE DE CHOC ÉLECTRIQUE, D'INCENDIE OU D'EXPLOSION**

Le non-respect des avertissements de sécurité pourrait entraîner un fonctionnement dangereux de l'appareil, des blessures graves, la mort ou des dommages matériels.

Un entreteïn incorrect pourrait entraîner un fonctionnement dangereux de l'appareil, des blessures graves, la mort ou des dommages matériels

Couper toute alimentation électrique au générateur d'air chaud avant de prodéder aux travaux d'entreteïn.

Figure 18 displays the proper routing of pressure switch tubing for \*MQ furnaces. All upflow / horizontal furnaces have two pairs of switches. One set is connected to the static tap on the inducer assembly and the other to the collector box. **IMPORTANT! The static tap on the inducer is located behind the 220V motor control. Disconnect all electrical power to the furnace before reaching behind the motor control.**



**Figure 18. Pressure Switch Tubing for \*MQ Upflow / Horizontal Furnaces**

## GAS SUPPLY & PIPING

### **WARNING:**

#### FIRE OR EXPLOSION HAZARD

- Failure to follow safety warnings exactly could result in serious injury or property damage.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

#### WHAT TO DO IF YOU SMELL GAS

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

### **AVERTISSEMENT:**

#### RISQUE D'INCENDIE OU D'EXPLOSION

- Le non-respect des avertissements de sécurité pourrait entraîner des blessures graves, la mort ou des dommages matériels.
- L'installation et l'entretien doivent être effectués par un installateur qualifié, un organisme de service ou le fournisseur de gaz.
- Ne pas entreposer ni utiliser de l'essence ni d'autres vapeurs ou liquides inflammables dans le voisinage de cet appareil, ni de tout autre appareil.

#### QUE FAIRE S'IL Y A UNE ODEUR DE GAZ

- Ne pas tenter d'allumer aucun appareil.
- Ne toucher à aucun interrupteur électrique; n'utiliser aucun téléphone dans le bâtiment.
- Évacuer l'immeuble immédiatement.
- Appeler immédiatement le fournisseur de gaz en employant le téléphone d'un voisin. Respecter à la lettre les instructions du fournisseur de gaz.
- Si personne ne répond, appeler le service des incendies.

All gas piping must be installed in compliance with local codes and utility regulations. In the absence of local codes the gas line installation must comply with the latest edition of the National Fuel Gas Code (ANSI Z223.1) or (CAN/CGA B149.1 or .2) Installation Codes.

#### **IMPORTANT NOTES:**

- Some local regulations require the installation of a manual main shut-off valve and ground joint union external to the furnace as depicted in Figure 19 (page 22). The shut-off valve should be readily accessible for service and/or emergency use. Consult the local utility or gas supplier for additional requirements regarding placement of the manual main gas shut-off.
- Gas piping must never run in or through air ducts, chimneys, gas vents, or elevator shafts.
- Compounds used on threaded joints of gas piping must be resistant to the actions of liquefied petroleum gases.
- The main gas valve and main power disconnect to the furnace must be properly labeled by the installer in case emergency shutdown is required.
- Flexible gas connectors are not recommended for this type of furnace but may be used if allowed by local jurisdiction. Only new flexible connectors may be used. Do not reuse old flexible gas connectors.
- A drip leg should be installed in the vertical pipe run to the unit as shown in Figure 19.

Table 9 (page 32) lists gas flow capacities for standard pipe sizes as a function of length in typical applications based on nominal pressure drop in the line.

The furnace may be installed for either left or right side gas entry. When connecting the gas supply, provide clearance between the gas supply line and the entry hole in the furnace casing to avoid unwanted noise and/or damage to the furnace. A typical gas service hookup is shown in Figure 19.

#### **Leak Check**

### **WARNING:**

#### FIRE OR EXPLOSION HAZARD

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

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. A fire or explosion may result causing property damage, personal injury or loss of life.

## ⚠️ AVERTISSEMENT:

### RISQUE D'INDENDIE OU D'EXPLOSION

Le non-respect des avertissements de sécurité pourrait d'entraîner des blessures graves, la mort ou des dommages matériels.

Ne jamais utiliser une flamme nue pour vérifier la présence des fuites de gaz. Pour la vérification de tous les joints, utiliser plutôt une solution savonneuse commerciale fabriquée spécifiquement pour la détection des fuites de gaz. Un incendie ou une explosion peut entraîner des dommages matériels, des blessures ou la mort.

After the gas piping to the furnace is complete, all connections must be tested for gas leaks. This includes pipe connections at the main gas valve, emergency shutoff valve and flexible gas connectors (if applicable). The soap and water solution can be applied on each joint or union using a small paintbrush. If any bubbling is observed, the connection is not sealed adequately and

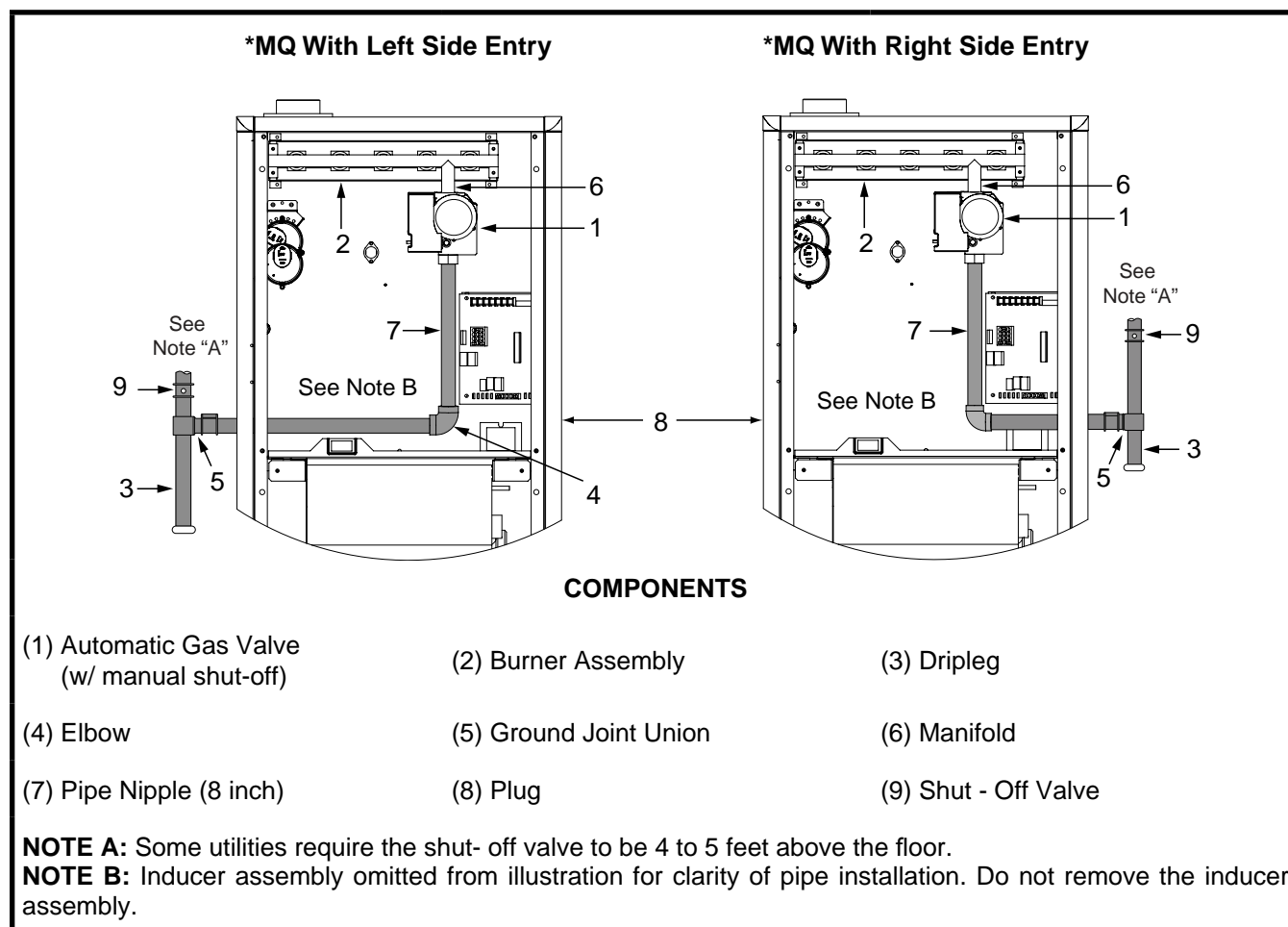
must be retightened. Repeat the tightening and soap check process until bubbling ceases.

**IMPORTANT NOTE:** When pressure testing gas supply lines at pressures greater than 1/2 psig (14 inch W.C.), the gas supply piping system must be disconnected from the furnace to prevent damage to the gas control valve. If the test pressure is less than or equal to 1/2 psig (14 inch W.C.), close the manual shut-off valve.

### High Altitude Application

The installation of this furnace at altitudes above 2,000 feet must meet the requirements of the National Fuel Gas Code or local jurisdiction. In Canada, the requirements for high altitude are different and governed by CGA B149.1. Please consult your local code authority.

The \*MQ furnace is derated by using the ALTITUDE ADJUST screen in the iQ Drive® thermostat. Simply select the altitude of the installation to the nearest 1,000 feet. No adjustment of the pressure regulator or orifice change is needed. When the selected altitude is above 2,000 feet, the iQ Drive® thermostat will not use the higher of its discrete input rates ("STEPS"), reducing the maximum output. Table 4 (page 23) lists the highest running step and its associated manifold pressures for each altitude.



**Figure 19. Typical Gas Connections**



ALTITUDE ABOVE SEA LEVEL	HIGHEST RUNNING STEP	MANIFOLD PRESSURE (NATURAL GAS)	MANIFOLD PRESSURE (PROPANE)	MAXIMUM INPUT RATE			
0	11	3.5	10.0	60,000	80,000	100,000	120,000
1,000	11	3.5	10.0	60,000	80,000	100,000	120,000
2,000	11	3.5	10.0	57,900	77,200	96,500	115,800
3,000	10	3.2	9.0	54,000	72,000	90,000	108,000
4,000	10	3.2	9.0	53,000	70,700	88,300	106,000
5,000	9	2.8	8.1	49,200	65,600	82,000	98,400
6,000	9	2.8	8.1	48,300	64,400	80,500	96,600
7,000	8	2.5	7.2	44,800	59,700	74,700	89,600
8,000	8	2.5	7.2	44,000	58,600	73,300	87,900
9,000	7	2.2	6.4	40,600	54,100	67,600	81,100
10,000	7	2.2	6.4	39,800	53,000	66,300	79,600

Table 4. High Altitude Deration Chart

## Conversion to LP/Propane

### **WARNING:**

The furnace was shipped from the factory equipped to operate on natural gas. Conversion to LP/propane gas must be performed by qualified service personnel using a factory supplied conversion kit. Failure to use the proper conversion kit can cause fire, explosion, property damage, carbon monoxide poisoning, personal injury, or death.

Conversion to LP/propane is detailed in the installation instructions provided with the conversion kit. Generally, this will require the replacement of the burner orifices and adding a jumper switch on the gas valve pressure regulator. See Figure 22 (page 27) for jumper switch location.

When conversion is complete, verify that the altitude is set properly in the ALTITUDE ADJUST Screen.

## ELECTRICAL WIRING

### **WARNING:**

#### ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury 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."

### **AVERTISSEMENT:**

#### RISQUE DE CHOC ÉLECTRIQUE, D'INCENDIE OU D'EXPLOSION

Le non-respect des avertissements de sécurité pourrait entraîner un fonctionnement dangereux de l'appareil, des blessures graves, la mort ou des dommages matériels.

Un entretein incorrect pourrait entraîner un fonctionnement dangereux de l'appareil, des blessures graves, la mort ou des dommages matériels.

- Couper toute alimentation électrique au générateur d'air chaud avant de prodéder aux travaux d'entretein.
- Au moment de l'entretein des commandes, étiquetez tous les fils avant de les débrancher. S'assurer de les raccorder correctement.
- S'assurer que l'appareil fonctionne adéquatement après l'entretein.

- Electrical connections must be in compliance with all applicable local codes, and the current revision of the National Electric Code (ANSI/NFPA 70).
- For Canadian installations the electrical connections and grounding shall comply with the current Canadian Electrical Code (CSA C22.1 and/or local codes).

## **CAUTION:**

**The Model Selection switches (Figure 25, page 33) are set by the factory and should not be changed in the field. Altering the switch settings will cause improper furnace operation. Consult your training manual for additional details.**

## **CAUTION:**

**Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

**IMPORTANT NOTE:** If replacing any of the original wires supplied with the furnace, the replacement wire must be copper wiring and have a temperature rating of at least 105°F (40°C). For electrical specifications, refer to the furnace nameplate or Table 10 (page 33).

\*MQ furnaces use high efficiency circulating air motors. The variable speed motor control board (Figure 24, page 33) controls the airflow at a constant CFM.

### **Line Voltage Wiring**

It is recommended that the line voltage (115 VAC) to the furnace be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the furnace. See Table 10 (page 33).

#### **IMPORTANT NOTES:**

- **An electrical disconnect must be installed readily accessible from and located within sight of the furnace. See Figure 20 (page 25) or the wiring diagram label inside of the control door. Any other wiring methods must be acceptable to authority having jurisdiction.**
- **Proper line voltage polarity must be maintained in order for the control system to operate correctly. Verify the incoming neutral line is connected to the white wire and the incoming “Hot” line is connected to the black wire. The furnace will not operate unless the polarity and ground are properly connected as shown in Figure 20.**

### **Thermostat / Low Voltage Connections**

**\*MQ furnaces cannot be controlled by conventional thermostats.** Only an iQ Drive® thermostat available from your distributor may be used to operate the \*MQ furnace. Field wiring instructions for all iQ system equipment can be found in the iQ Drive System Field Wiring Instructions

(P/N 709031). The iQ Drive® thermostat is connected to the furnace by running 4 wires from the thermostat to terminal P5 on the furnace control board (Figure 21a, page 25). If this MQ furnace is part of an iQ Zone system, refer to Figure 21b. **Field supplied wiring is recommended to be a 4 wire shielded cable and must be a minimum of 18 gauge.**

#### Single Stage AC (See Fig. 21c)

1. Connect the **C** terminal on the AC unit to the **C** terminal on the motor control board.
2. Connect the **Y** terminal on the AC unit to the **Y/Y2\_OUT** terminal on the motor control board.

#### Two - Stage AC (See Fig. 21d)

1. Connect the **C** terminal on the AC unit to the **C** terminal on the furnaces motor control board.
2. Connect the **Y1** terminal on the AC unit to the **Y1\_OUT** terminal on the motor control board.
3. Connect the **Y2** terminal on the AC unit to the **Y/Y2\_OUT** terminal on the motor control board.

#### Single Stage Heat Pump (See Fig. 21e)

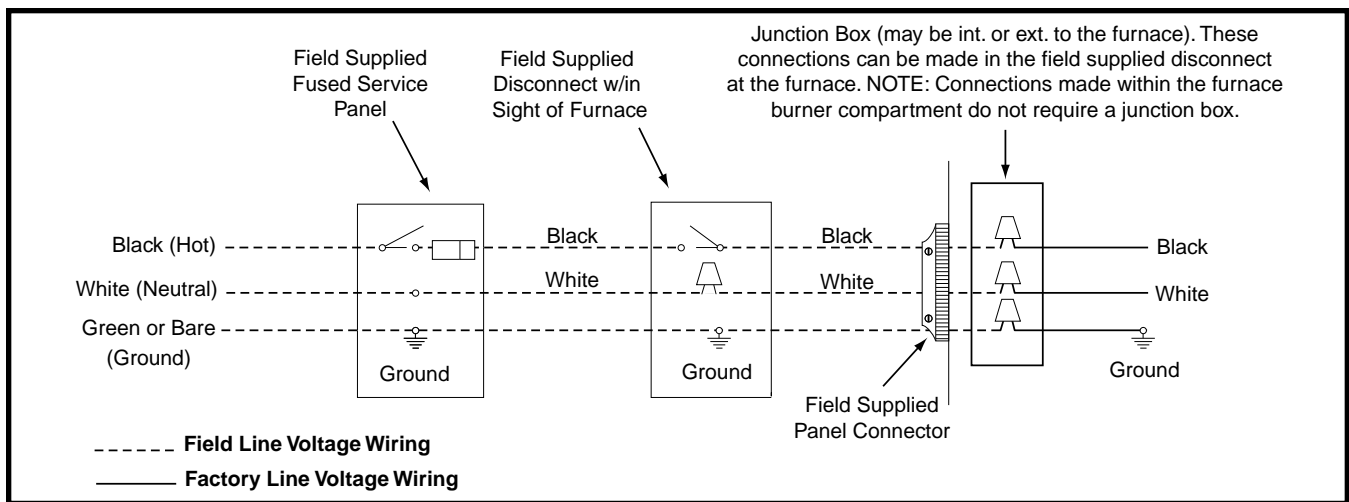
1. Connect the **W2** terminal on the heat pump to the **Y1/E** input terminal on the motor control board.
2. Connect the **C** terminal on the heat pump to the **C** terminal on the motor control board.
3. Connect the **R** terminal on the heat pump to the **R** terminal on the motor control board.
4. Connect the **Y** terminal on the heat pump to the **Y/Y2** output terminal on the motor control board.
5. Connect the **O** terminal on the AC unit to the **W/O** output terminal on the motor control board.

#### Two - Stage Heat Pump (See Fig. 21f)

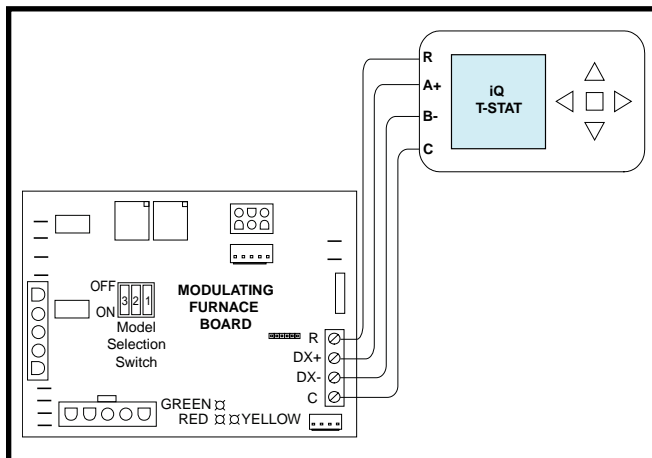
1. Connect the **W2** terminal on the heat pump to the **Y1/E** input terminal on the motor control board.
2. Connect the **C** terminal on the heat pump to the **C** terminal on the motor control board.
3. Connect the **R** terminal on the heat pump to the **R** terminal on the motor control board.
4. Connect the **Y** terminal on the heat pump to the **Y1** output terminal on the motor control board.
5. Connect the **Y2** terminal on the heat pump to the **Y/Y2** output terminal on the motor control board.
6. Connect the **O** terminal on the AC unit to the **W/O** output terminal on the motor control board.

If installing a single or two-stage conventional heat pump, it is recommended that an outdoor temperature sensor (920938) be installed on the system. The sensor connects to the iQ thermostat (Figures 21e & 21f, page 26) and measures the outdoor temperature at the unit. The outdoor temperature is displayed on the main screen of the iQ thermostat and the system switches between furnace and heat pump based on the outdoor temperature.

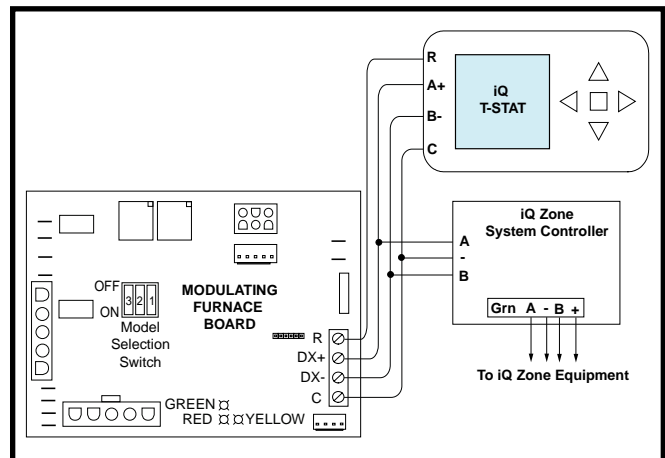




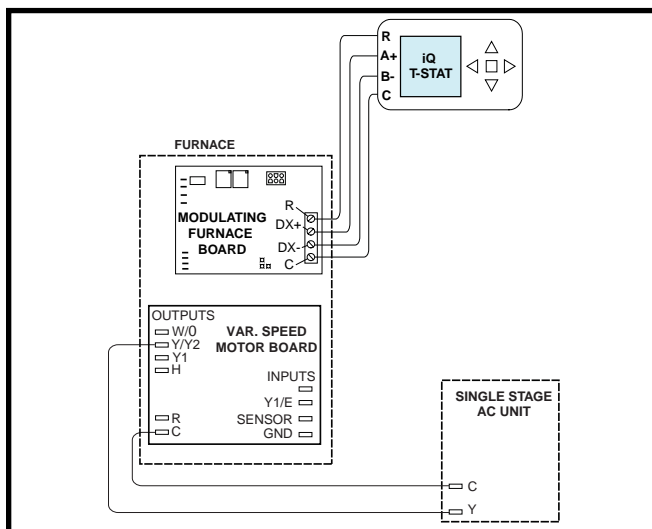
**Figure 20. Line Voltage Field Wiring**



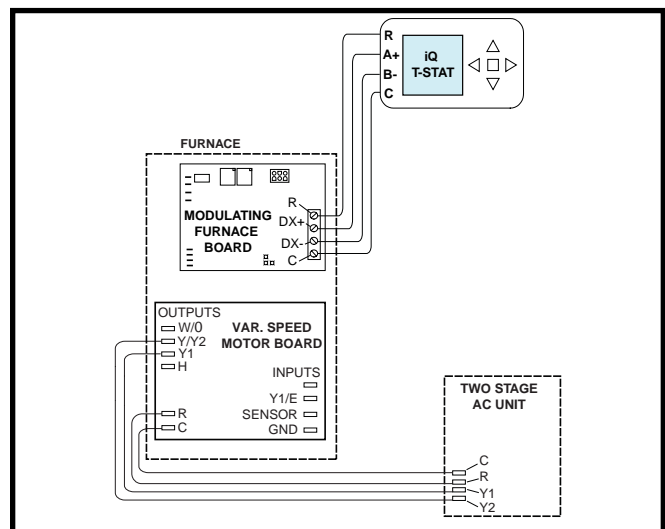
**Figure 21a. Low Voltage Field Wiring (MQ Furnace Without iQ Zone System)**



**Figure 21b. Low Voltage Field Wiring (MQ Furnace With iQ Zone System)**



**Figure 21c. Low Voltage Field Wiring (Conventional Single-Stage AC)**



**Figure 21d. Low Voltage Field Wiring (Conventional Two-Stage AC)**

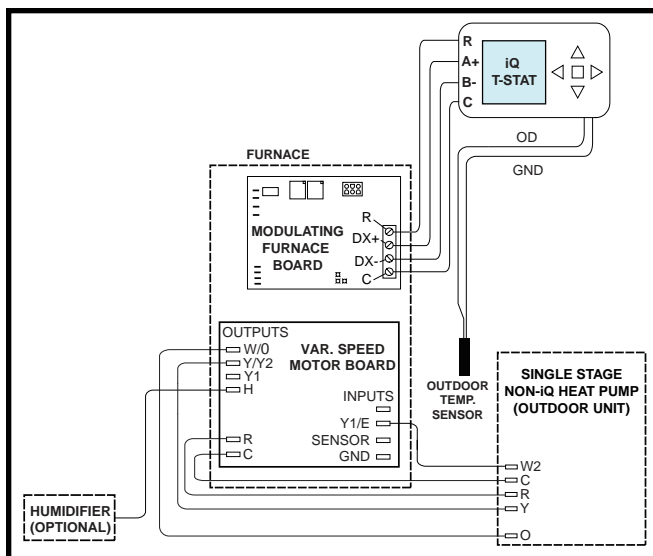


Figure 21e. Low Voltage Field Wiring  
(Conventional Single Stage Heat Pump)

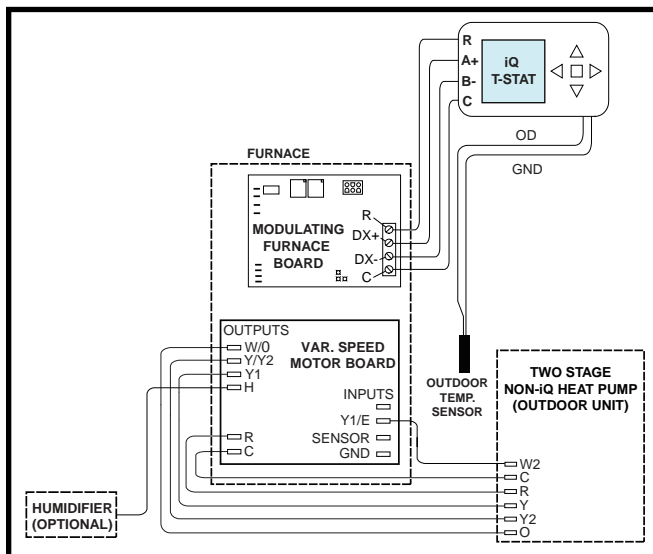


Figure 21f. Low Voltage Field Wiring  
(Conventional Two Stage Heat Pump)

## Grounding

### **WARNING:**

To minimize personal injury, the furnace cabinet must have an uninterrupted or unbroken electrical ground. The controls used in this furnace require an earth ground to operate properly. Acceptable methods include electrical wire or conduit approved for ground service. Do not use gas piping as an electrical ground!

## START-UP & ADJUSTMENTS

### **WARNING:**

#### **ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD**

Failure to follow safety warnings exactly could result in serious injury 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."

### **AVERTISSEMENT:**

#### **RISQUE DE CHOC ÉLECTRIQUE, D'INCENDIE OU D'EXPLOSION**

Le non-respect des avertissements de sécurité pourrait entraîner un fonctionnement dangereux de l'appareil, des blessures graves, la mort ou des dommages matériels.

Un entretien incorrect pourrait entraîner un fonctionnement dangereux de l'appareil, des blessures graves, la mort ou des dommages matériels

- Couper toute alimentation électrique au générateur d'air chaud avant de prodéder aux travaux d'entretien.
- Au moment de l'entretien des commandes, étiquetez tous les fils avant de les débrancher. S'assurer de les raccorder correctement.
- S'assurer que l'appareil fonctionne adéquatement après l'entretien.

## Pre-Start Check List

- ✓ Verify the polarity of the connections are correct, the line voltage power leads are securely connected and the furnace is properly grounded.
- ✓ Verify the thermostat wires (R, DX+, DX-, & C) are securely connected to the correct leads on the terminal strip of the circuit board. See Figures 21a-f (pages 25 - 26).
- ✓ Verify the gas line service pressure does not exceed 10.0 inches of water column, and is not less than 4.5 inches W.C. for natural gas. For LP gas the line service pressure must not exceed 14 in. W.C., and must not be less than 11.0 in. W.C.
- ✓ Verify the manual reset roll-out switch is closed. If necessary, press the button to reset the switch. **DO NOT install a jumper wire across a switch to defeat its function. If a switch reopens on start-up,**

**DO NOT reset the switch without identifying and correcting the fault condition.**

- ✓ Verify the blower door is in place, closing the door switch in the line voltage circuit.
- ✓ Verify the gas line has been purged and all connections are leak free.

## System Configuration

Before applying gas to the furnace, the iQ system must be configured to the appliance(s) it is connected to. MQ furnaces, iQ Drive® air conditioners and iQ Drive® heat pumps are identified automatically when power is supplied to the thermostat. Conventional (non-iQ) heating or cooling appliances must be configured manually.

Use the System Configuration screen to verify the configuration is correct. After accepting the configuration, set the desired furnace rise.

If the installation is at an altitude of 2,000 feet or more, set the altitude in the ALTITUDE ADJUST Screen.

## Start-up Procedures

Do not perform these steps until all of the checks in the previous steps have been completed:

1. Set the thermostat mode to HEAT.
2. Set the thermostat setpoint to 5° below room temperature.
3. Turn off all electrical power to the furnace.
4. Follow the Operating Instructions on the furnace label.
5. Set the thermostat above room temperature and verify the Operating Sequence (page 28).
6. After 5 minutes of operation, set the thermostat below room temperature and verify steps 8 & 9 of the Operating Sequence.

## Verifying & Adjusting the Input Rate

**IMPORTANT NOTE: The input rate must not exceed the rate shown on the furnace rating plate. At altitudes above 2,000 feet, it must not exceed that on the rating plate less 4% for each 1,000 feet.**

The input rate must be verified for each installation to prevent over-firing of the furnace. To determine the exact input rate, perform the following procedures:

1. Shut off all other gas fired appliances.
2. Start and run the furnace for at least 3 minutes.
3. View the furnace status screen and verify the furnace is operating at full capacity. The Highest Running Step and Maximum Input Rate for various altitudes is listed in Table 5 (page 23)
4. Measure the time (in seconds) required for the gas meter to complete one revolution.
5. Convert the time per revolution to cubic feet of gas per hour using Table 8 (page 32).
6. Multiply the gas flow rate in cubic feet per hr by the heating value of the gas in Btu per cubic ft to obtain the input rate in Btuh. See example above.

### Example:

- Time for 1 revolution of a gas meter with a 1 cubic foot dial = 40 seconds.
- From Table 9 read 90 cubic ft gas per hr.
- Local heating value of the gas (obtained from gas supplier) = 1,040 Btu per cubic foot.
- Input rate = 1,040 x 90 = 93,600 Btuh.

7. The manifold pressure must be set to the appropriate value for each installation by a qualified installer, service agency or the gas supplier.

## WARNING:

**Do not attempt to drill the gas orifices. Use only factory supplied orifices. Improperly drilled orifices may cause fire, explosion, carbon monoxide poisoning, personal injury or death.**

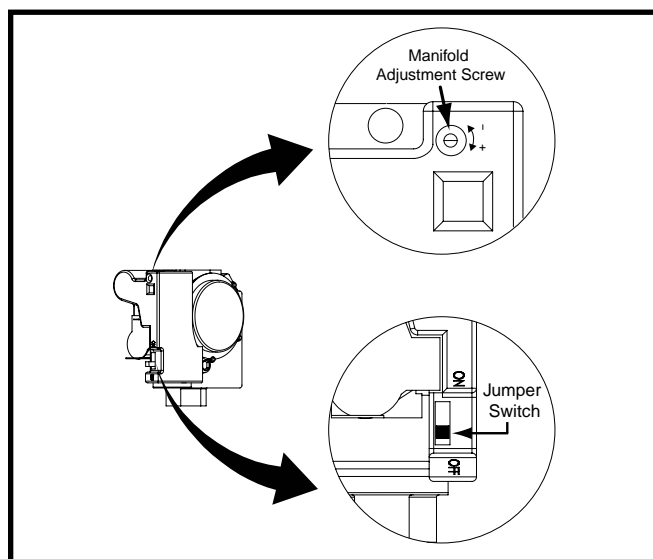
- a.) Obtain the manifold pressure setting required for this installation by referring to Table 4 (page 23).
- b.) Using a small screw driver, turn the adjusting screw (Figure 22) on the regulator to adjust the full input setting.

**IMPORTANT NOTE: Turning the adjusting screw clockwise increases the pressure and counterclockwise reduces the pressure.**

## Verifying & Adjusting Temperature Rise

Confirm the temperature rise through the furnace is within the limits specified on the furnace rating plate. Any temperature rise outside the specified limits could result in premature failure of the heat exchanger.

1. Place thermometers in the return and supply air stream as close to the furnace as possible. To avoid false readings, the thermometer on the supply air side



**Figure 22. Modulating Gas Valve**

must be shielded from direct radiation from the heat exchanger.

2. Adjust all registers and duct dampers to the desired position. Run the furnace for 10 to 15 minutes on the maximum step for your altitude in Table 4 before taking any temperature readings. The temperature rise is the difference between the supply and return air temperatures.

For typical duct systems, the temperature rise will fall within the limits specified on the rating plate. If the measured temperature rise is not the correct value, choose another rise or adjust your ductwork.

## Verifying Burner Operation

### CAUTION:

**The door over the burners may only be open for inspection purposes only. The door must be installed during unattended operation.**

1. Remove the burner compartment door.
2. Set the thermostat above room temperature and observe the ignition sequence. The burner flame should carry over immediately between all burners without lifting off, curling, or floating. The flames should be blue, without yellow tips.
3. After validating flame characteristics, change thermostat setting to below room temperature.
4. Verify burner flame is completely extinguished.
5. Replace the burner compartment door.

## Verifying Operation of the Supply Air Limit Switch

**NOTE:** A properly functioning limit switch should turn off the gas valve when the return is blocked (time depends on how well the return air is blocked). When the limit switch opens, the inducer blower should run for 30 seconds and the circulating air blower will run continuously.

1. Check the blower door and verify that it is securely mounted in place and that there is power to the furnace.
2. Block the return airflow to the furnace by installing a close-off plate in place of or upstream of the filter(s).
3. Set the thermostat above room temperature and observe the Operating Sequence.
4. Remove the close-off immediately after the limit switch opens. If the furnace continues to operate with no return air, set the thermostat to a temperature below room temperature, shut off the power to the furnace, and replace the limit switch.

## OPERATING SEQUENCE

The operating sequences for the heating, cooling, and fan modes are described below. Refer to the field and furnace wiring diagrams: (Figures 21a-f, pages 25 - 26) and (Figure 26, page 34).

### Heating Cycle

1. The thermostat calls for heat through the communication cable.
2. The control checks the availability of the pressure switches.
  - a.) If the switches are closed, the furnace will shut down for 5 minutes before retrying.
  - b.) If the pressure switches are open, the control energizes the inducer and waits for the low pressure switches to close. The low pressure switches must close within 12 seconds.
3. The control runs the inducer for a 30 second pre-purge.
4. The control energizes the igniter output for an adaptive warm-up time limit.
5. The furnace ignites the burners at 75% (**Step 6**) of maximum input rate. The thermostat will choose different inputs after the flames have stabilized.
6. If the flame is proved and ignites the gas, the control de-energizes the igniter. The gas valve and inducer remains energized. The control goes to blower on delay.
7. The control energizes the blower on the selected speed 10 seconds after the gas valve opens. The gas valve and inducer remain energized.
  - a.) If the heating load is 75% of maximum input or less, the low pressure switches must remain closed. If any of the low pressure switches are open, the furnace will shut down.
  - b.) If the heating load is greater than 75%, the high pressure switches must be closed. If any of the high pressure switches are open, the furnace will only operate below 75% of maximum input rate.
  - c.) If both high and low pressure switches are open, the furnace will shut off.
8. When the thermostat demand for heat is satisfied, the control de-energizes the gas valve. The inducer output remains on for a 30 second post-purge period.
9. The circulating air blower will continue to run for the selected Blower Off Delay as set in the Blower OFF Delay screen.

## Cooling Cycle

The iQ Drive® thermostat handles cooling in two ways:

- For iQ Drive® Ready air conditioners and heat pumps, the thermostat communicates directly to the appliances through the communications cable, turning on the cooling appliance and furnace blower.
- For conventional 1 or 2 stage air conditioners or heat pumps/, the thermostat communicates to the furnace through the communications cable. The furnace then issues the call for cooling through the **Y/Y2** or **Y1** and **W/O** terminals on the motor control board.
- The thermostat also issues commands to energize the furnace circulating air blower. When the demand for cooling is satisfied, the thermostat turns off the cooling appliance. The furnace blower continues to operate for 30 seconds before shutting down.

## Fan Mode

If continuous fan is selected through the Mode Screen, the iQ Drive® thermostat communicates this command through the communications cable.

- If there is no demand for heating or cooling, the blower runs at the speed selected in the manual fan speed screen.
- If a call for cooling is received, the furnace will change to a blower speed that is needed for cooling.
- If a command for heating is received, the blower will change to the required speed.

## Intermittent Fan Mode

In this mode, occasional air circulation can be programmed through the intermittent fan screen. The circulating blower will cycle on and off at a reduced blower speed. If there is a call for heating or cooling, it takes precedence over intermittent operation.

## MAINTENANCE

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### **WARNING:**

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**These maintenance instructions are primarily intended to assist qualified technicians experienced in the proper maintenance and operation of this appliance.**

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Proper maintenance is most important to achieve the best performance from a furnace. Follow these instructions for years of safe, trouble free operation.

- Always reinstall the doors on the furnace after servicing or cleaning/changing the filters. Do not operate the furnace without all doors and covers in place.
- Verify that the thermostat is properly installed and is not affected by drafts or heat from lamps or other appliances.
- To achieve the best performance and minimize equipment failure it is recommended that a yearly maintenance checkup be performed. At a minimum, this check should include the following items:

**Blower Compartment** - Dirt and lint can create excessive loads on the motor resulting in higher than normal operating temperatures and shortened service life. It is recommended that the blower compartment be cleaned of dirt or lint that may have accumulated in the compartment or on the blower and motor as part of the annual inspection.

**Air Filter(s)** - Air filter(s) are not supplied with the furnace as shipped from the factory. The installer must provide a high velocity filter and rack for a filter in the return air duct adjacent to the furnace, or in a return air grill to the furnace.

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### **WARNING:**

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**Never operate the furnace without a filter in place. Dust and lint in the return air can build up on internal components, resulting in loss of efficiency, equipment damage, and possible fire.**

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It is recommended that filters be cleaned or replaced monthly. New or newly renovated homes may require more frequent changing until the construction dust has minimized.

Filters designed to remove smaller particles such as pollen, may require additional maintenance. Filters for side return and bottom return applications are available from most local distributors.

**Cleaning of Burners** - If the burners must be cleaned, follow the steps below and see page 39 for component description and location.

1. Shut off gas supply to the furnace at the meter or at a manual valve in the supply piping.
2. Turn off all power to the furnace and set the thermostat to it's lowest setting.
3. Remove the burner door from the furnace.

4. Turn the gas control switch to the OFF position.
5. Disconnect the wires from the gas valve, igniter, flame sensor, and flame rollout switch.
6. Using two wrenches, separate the ground-joint union in the gas supply piping at the furnace.
7. Remove the piping between the Gas Valve and the ground-joint union. (If applicable).
8. Remove all screws securing the Manifold Assembly to the Burner Box.
9. Carefully remove the burner assembly from the furnace. **DO NOT DAMAGE THE IGNITER WHILE REMOVING THE BURNER ASSEMBLY.**
10. Inspect the burners for accumulated dust or debris. If necessary carefully clean them with a soft wire brush and a vacuum cleaner. **DO NOT DAMAGE THE IGNITER WHILE CLEANING THE BURNER.**
11. Replace all the parts in reverse order that they were removed.
12. Follow the lighting instructions found on the furnace door to return the furnace to operation. Verify proper operation after servicing.

**Heat Exchanger & Burner** - The furnace should operate for many years without soot buildup in the flue passageways, however, the flue, vent system, and burners should be inspected and cleaned (if required) by a qualified service technician annually to ensure continued safe operation. Pay attention to any deterioration from corrosion or other sources.

## **WARNING:**

**Holes in the vent pipe or heat exchanger can cause combustion products to enter the home. Replace the vent pipe or heat exchanger if leaks are found. Failure to prevent the circulation of combustion products into the living space can create potentially hazardous conditions including carbon monoxide poisoning that could result in personal injury or death.**

**Venting System** - Check the inlet pipe (if applicable) and outlet pipe to ensure they are not blocked by debris. Any damaged section of vent pipe must be replaced, and any obstruction or blockage must be removed prior to operating the furnace.

## **TROUBLESHOOTING**

### **If the furnace fails to operate check the following:**

- Is the thermostat operating properly?
- Are the blower compartment door(s) in place?
- Is the furnace disconnect closed?
- Has the circuit breaker tripped or the control board fuse burned open?
- Is the gas turned on?
- Are any manual reset switches open?
- Is the filter dirty or plugged?
- Is the flame sensor coated? (Remove and clean with steel wool. **(Do not use emery cloth or sandpaper!)**)
- Is there blockage in the condensate drain tube? Also verify that there is no double trapping of condensate.
- Is the secondary heat exchanger free of debris and clogs?
- Is evaporator coil clean and free of debris (If applicable).
- Are all the LED's on the furnace and motor control boards constantly ON? If not, refer to Tables 5 & 6 to determine fault condition.

**IMPORTANT NOTE: The furnace will lock out after 5 failed attempts for ignition and will try again every hour if the call for heat remains.**

- If the Inducer Blower is operating, and items above have been verified, check the Blower Limit Switch (Figure 30, page 39) and reset if necessary.
- If the furnace operates when the Blower Limit Switch is reset, contact a qualified service technician to identify and repair the problem.
- If the furnace still doesn't operate, check the Flame Roll-out Switches (Figure 30) and reset if necessary.
- If the furnace operates when the Flame Rollout Switch is reset, contact a qualified service technician to identify and repair the problem.

DIAGNOSTIC DESCRIPTION	GREEN LED	RED LED
Control Fault (No Power)	Off	Off
L1/Neutral Polarity Fault	Flash	Flash
1 Hour Lockout	Alternating Flash	
Normal Operation	Heart Beat	On
Low Pressure Switch Closed Fault	On	Flash
Low Pressure Switch Open Fault	Flash	On
Open Limit Switch Fault	Flash	Off
High Pressure Switch Open or Closed Fault	Off	Flash

**Table 5. Furnace Control Board Fault Conditions**

DIAGNOSTIC DESCRIPTION	GREEN LED	RED LED
Control Fault (No Power)	Off	Off
Normal Operation	Heart Beat	On
Motor Fault	On	Flash
Communications Fault	Flash	Flash

**Table 6. Motor Control Board Fault Conditions - Variable Speed**

## FIGURES & TABLES

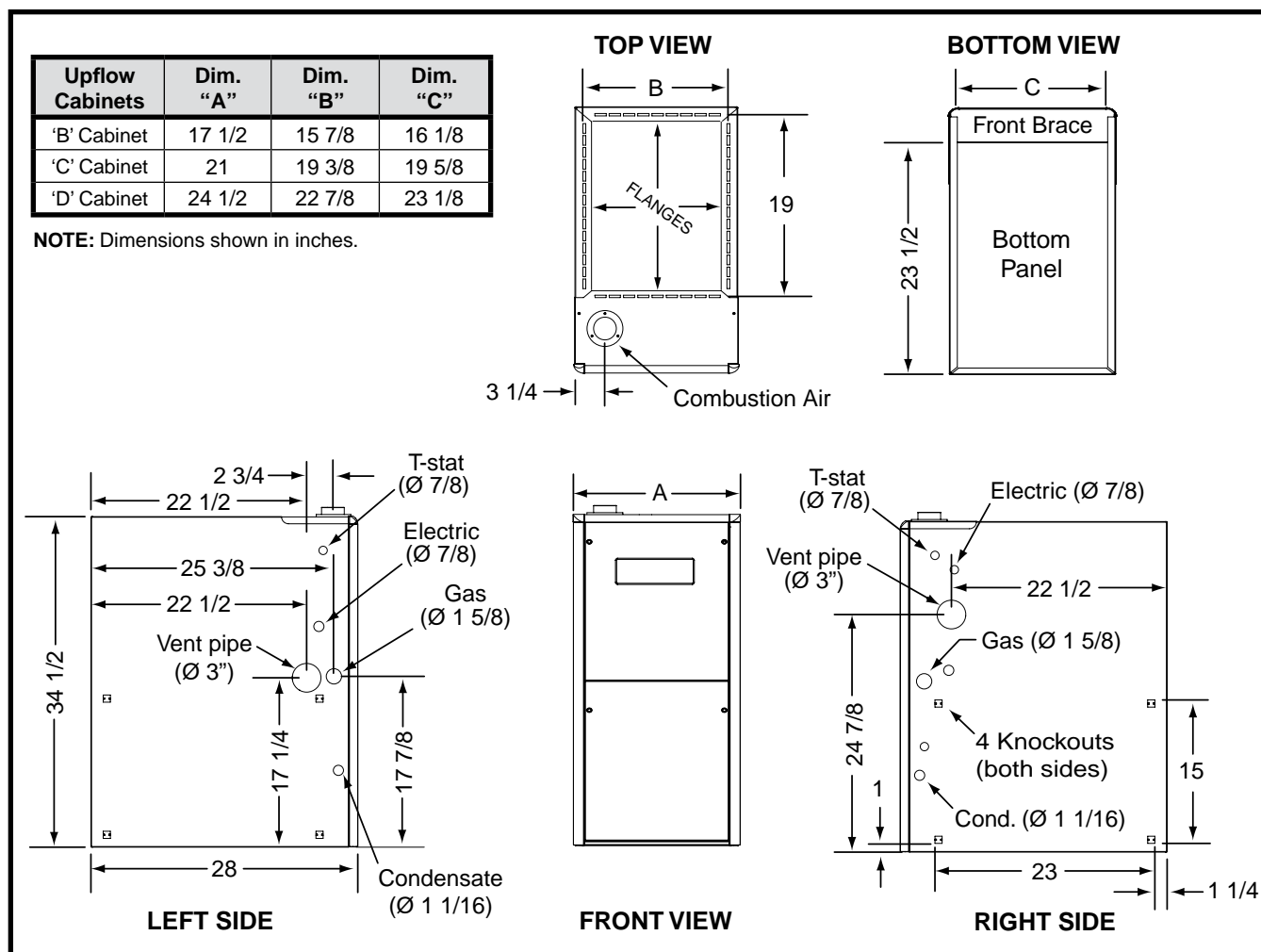


Figure 23. \*MQ Furnace Dimensions

## AIRFLOW DATA

GAS INPUT RATE (BTUH)	TARGET CFM FOR SELECTED CIRCULATING AIR TEMPERATURE RISES, °F								
	45		50		55		60		CONSTANT
	FULL INPUT	MINIMUM INPUT	FULL INPUT	MINIMUM INPUT	FULL INPUT	MINIMUM INPUT	FULL INPUT	MINIMUM INPUT	
60,000	1,110	635	1,000	560	940	515	850	470	950
80,000	1,480	850	1,345	740	1,255	685	1,140	625	1,300
100,000	1,850	1,050	1,680	925	1,565	855	1,460	780	1,760
120,000	2,225	1,270	2,020	1,115	1,890	1,025	1,730	940	2,100

**NOTE:** This table lists the HIGH and LOW target CFMs for each maximum input rate and temperature rise. If the target CFM is more than 1,600 CFM, it is recommended that two return air openings into the furnace be used.

Table 7. Modulating Furnace CFM Targets

## GAS INFORMATION

GAS FLOW RATES (CUBIC FEET PER HOUR)				GAS FLOW RATES (CUBIC FEET PER HOUR)			
TIME FOR ONE REVOLUTION (SECONDS)	CUBIC FEET PER REVOLUTION OF GAS METER			TIME FOR ONE REVOLUTION (SECONDS)	CUBIC FEET PER REVOLUTION OF GAS METER		
	1	5	10		1	5	10
10	360	1,800	3,600	66	55	273	545
12	300	1,500	3,000	68	53	265	529
14	257	1,286	2,571	70	51	257	514
16	225	1,125	2,250	72	50	250	500
18	200	1,000	2,000	74	49	243	486
20	180	900	1,800	76	47	237	474
22	164	818	1,636	78	46	231	462
24	150	750	1,500	80	45	225	450
26	138	692	1,385	82	44	220	439
28	129	643	1,286	84	43	214	429
30	120	600	1,200	86	42	209	419
32	113	563	1,125	88	41	205	409
34	106	529	1,059	90	40	200	400
36	100	500	1,000	92	39	196	391
38	95	474	947	94	38	191	383
40	90	450	900	96	38	188	375
42	86	429	857	98	37	184	367
44	82	409	818	100	36	180	360
46	78	391	783	102	35	176	353
48	75	375	750	104	35	173	346
50	72	360	720	106	34	170	340
52	69	346	692	108	33	167	333
54	67	333	667	110	33	164	327
56	64	321	643	112	32	161	321
58	62	310	621	114	32	158	316
60	60	300	600	116	31	155	310
62	58	290	581	118	31	153	305
64	56	281	563	120	30	150	300

**Table 8. Gas Flow Rates**

CAPACITY OF BLACK IRON GAS PIPE (CU. FT. PER HOUR) FOR NATURAL GAS (SPECIFIC GRAVITY - 0.60)								
NOMINAL BLACK IRON PIPE DIAMETER (IN.)	LENGTH OF PIPE RUN (FT)							
	10	20	30	40	50	60	70	80
1/2	130	90	75	65	55	50	45	40
3/4	280	190	150	130	115	105	95	90
1	520	350	285	245	215	195	180	170
1 1/4	1,050	730	590	500	440	400	370	350
1 1/2	1,600	1,100	890	760	670	610		
Cubic Feet Per Hour Required = $\frac{\text{Input To Furnace (Btu/hr)}}{\text{Heating Value of Gas (Btu/Cu. Ft.)}}$								

**NOTE:** The cubic feet per hour listed in the table above must be greater than the cubic feet per hour of gas flow required by the furnace. To determine the cubic feet per hour of gas flow required by the furnace, divide the input rate of the furnace by the heating value (from gas supplier) of the gas.

**Table 9. Black Iron Gas Pipe Capacities**



## ELECTRICAL INFORMATION

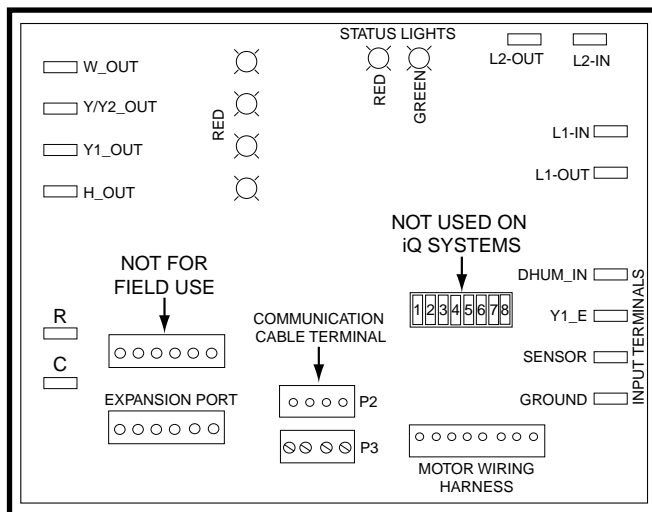
FURNACE INPUT (BTUH)	CABINET WIDTH (IN.)	NOMINAL ELECTRICAL SUPPLY	MAXIMUM OPERATING VOLTAGE	MINIMUM OPERATING VOLTAGE	MAXIMUM FURNACE AMPERES	MINIMUM WIRE GAUGE	MAXIMUM FUSE OR CIRCUIT BREAKER AMPS**
60,000	17 ½	115-60-1	127	103	7.2	14	15
80,000	21	115-60-1	127	103	9.4	14	20
100,000	21	115-60-1	127	103	9.4	14	20
120,000	24 ½	115-60-1	127	103	11.9	14	25

THERMOSTAT WIRE GAUGE	RECOMMENDED THERMOSTAT WIRE LENGTH	
	2 - WIRE (HEATING)	4 OR 5 WIRE (COOLING)
24	55 ft.	25 ft.
22	90 ft.	45 ft.
20	140 ft.	70 ft.
18	225 ft.	110 ft.

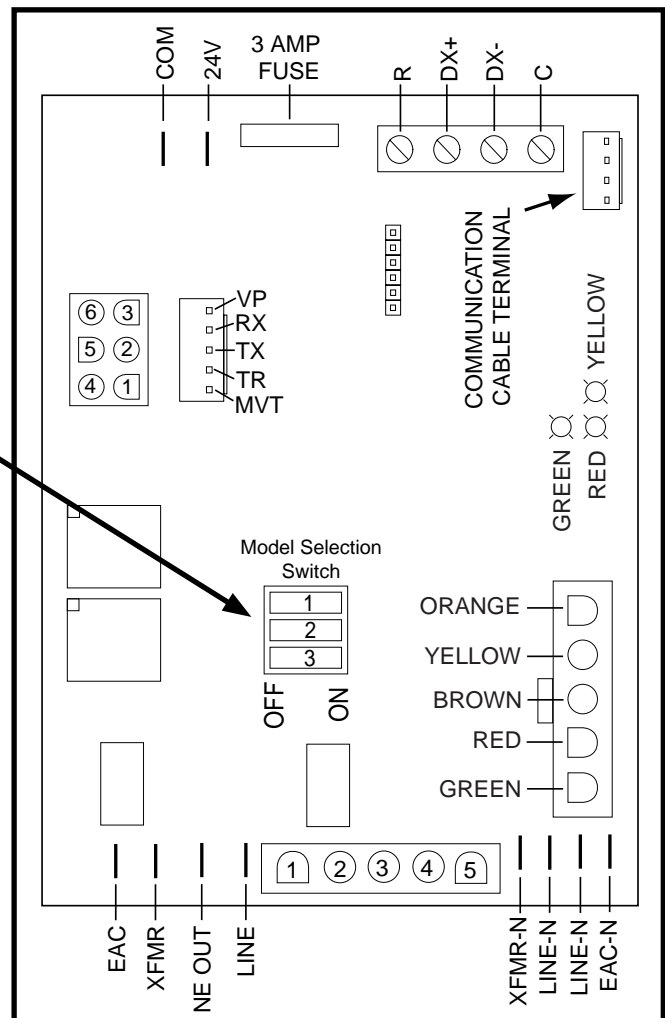
\*\* Time-delay fuses or HACR-type circuit breakers are required.

**Table 10. Wire Length & Voltage Specifications**

Btuh Input	SWITCH NUMBER		
	1	2	3
60,000	OFF	OFF	OFF
80,000	ON	OFF	OFF
100,000	OFF	ON	OFF
120,000	ON	ON	OFF



**Figure 24. Variable Speed Motor Control Board**



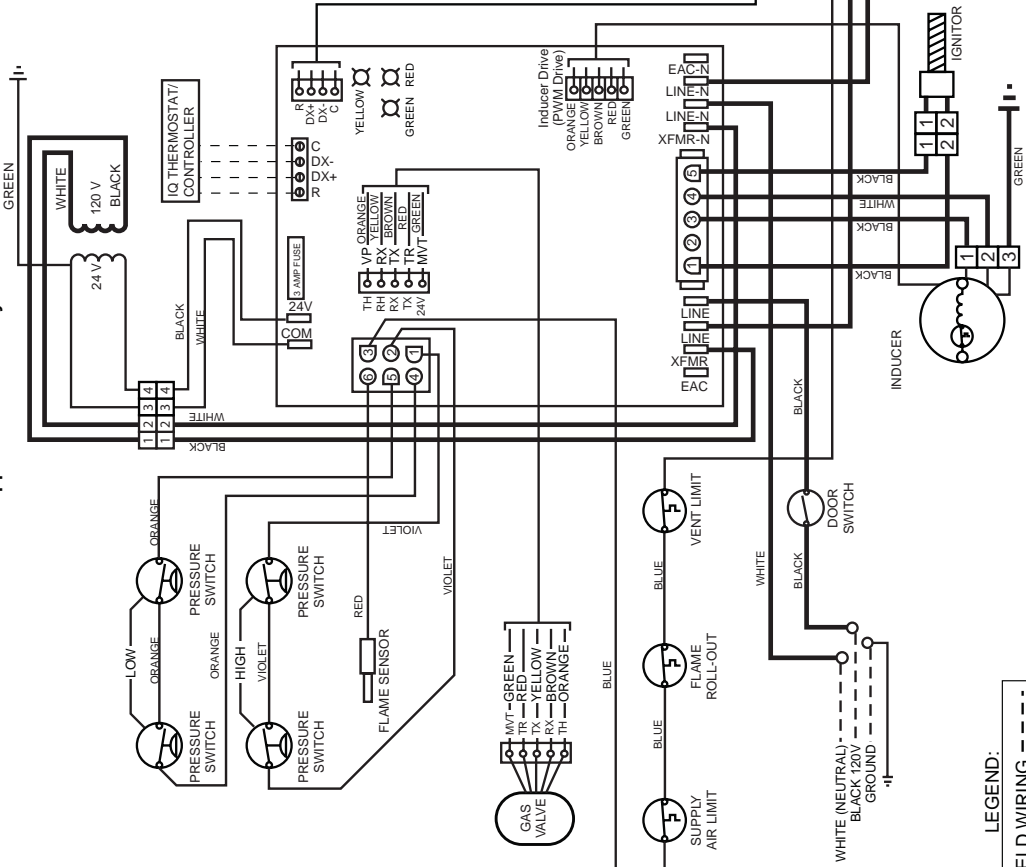
**Figure 25. Modulating Furnace Control Board**

# WIRING DIAGRAM

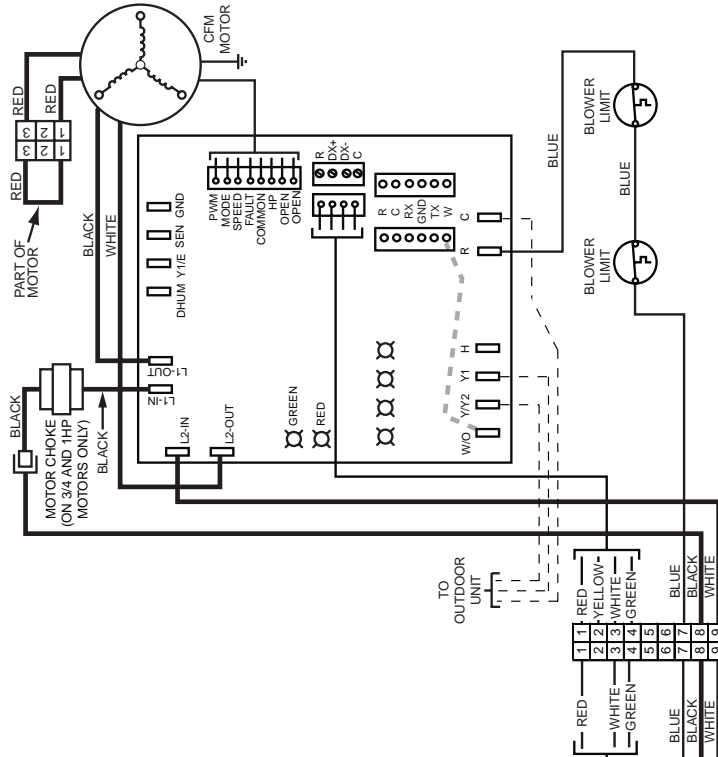
## For 97+ Modulating Gas Furnaces

Refer to the Installation Instructions provided with the kit for the proper heating and cooling speeds for your application.

Use copper conductors only.



FAULT CONDITIONS		
Diagnostic Description	Green LED	Red LED
Control Fault (No Power)	Off	Off
Line Neutral Polarity Fault	Flash	Flash
1 Hour Lockout	Alternating Flash	On
Normal Operation	Heatbeat	On
Low Pressure Switch Closed Fault	Flash	On
Low Pressure Switch Open Fault	Flash	Off
Open Limit Switch Fault	Flash	Off
High Pressure Switch Open or Closed Fault	Off	Flash
Diagnostic Description		
Diagnostic Description	Yellow LED	
Low Flame Sensor Signal	Continuous Flash	
Flame Present	On	

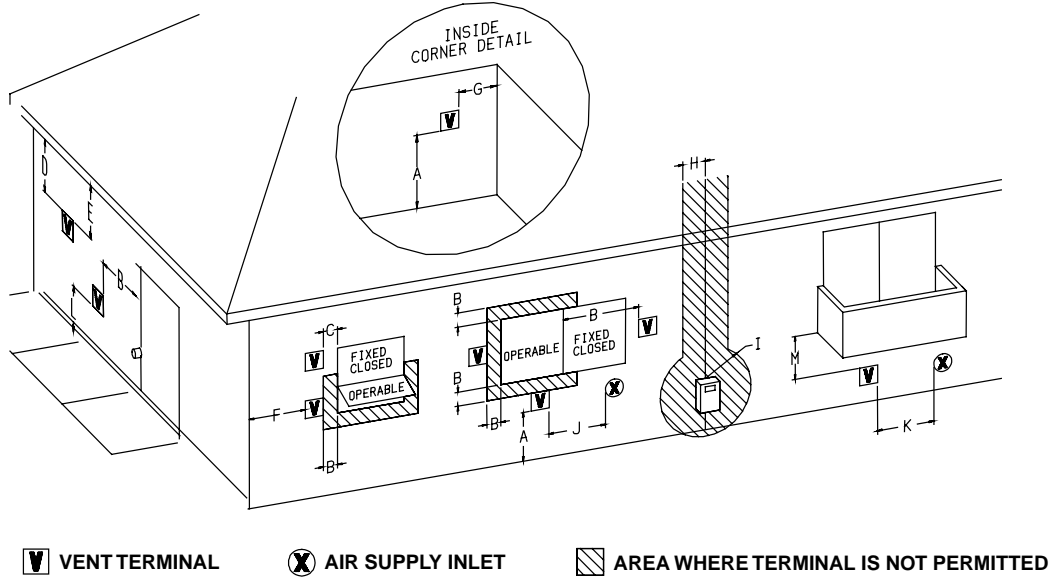


711001B  
(Replaces 711001A)  
04/11



Figure 26. Wiring Diagram for Variable Speed Modulating Furnaces

## VENTING INFORMATION



Clearance Location		CANADIAN INSTALLATIONS <sup>a</sup>	US INSTALLATIONS <sup>b</sup>	
		Direct Vent (2-pipe) & Conventional Vent (1-pipe) Furnaces	Direct Vent (2-pipe) Furnaces	Conventional Vent (1-pipe) Furnaces
A =	Clearance above grade, veranda, porch, deck, balcony, or maximum expected snow level.	12 inches (30cm)	12 inches (30cm)	12 inches (30cm)
B =	Clearance to window or door that may be opened.	6 inches (15cm) for appliances < 10,000 Btuh (3kW) 12 inches (30cm) for appliances 10,000 Btuh - 100,000 Btuh (30kW) 36 inches (91cm) for appliances > 100,000 Btuh (30Kw)	6 inches (15cm) for appliances < 10,000 Btuh (3kW) 9 inches (23cm) for appliances 10,000 Btuh - 50,000 Btuh (30kW) 12 inches (30cm) for appliances > 50,000 Btuh (30Kw)	4 ft. (1.2m) below or to side of opening; 1 ft. (300mm) above opening
C =	Clearance to permanently closed window	*	*	*
D =	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61cm) from the center line of the terminal.	*	*	*
E =	Clearance to unventilated soffit.	*	*	*
F =	Clearance to outside corner.	*	*	*
G =	Clearance to inside corner.	*	*	*
H =	Clearance to each side of center line extended above meter/regulator assembly.	3 feet (91cm) within a height 15 feet above the meter/regulator assembly	*	*
I =	Clearance to service regulator vent outlet.	3 feet (1.83m)	*	*
J =	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance.	6 inches (15cm) for appliances < 10,000 Btuh (3kW) 12 inches (30cm) for appliances 10,000 Btuh - 100,000 Btuh (30kW) 36 inches (91cm) for appliances > 100,000 Btuh (30Kw)	6 inches (15cm) for appliances < 10,000 Btuh (3kW) 9 inches (23cm) for appliances 10,000 Btuh - 50,000 Btuh (30kW) 12 inches (30cm) for appliances > 50,000 Btuh (30Kw)	4 ft. (1.2m) below or to side of opening; 1 ft. (300mm) above opening
K =	Clearance to mechanical air supply inlet.	6 feet (1.83m)	3 feet (91cm) above if within 10 feet (3m) horizontally	3 ft. (91cm) above if within 10 feet (3m) horizontally
L =	Clearance above paved sidewalk or driveway located on public property.	7 feet (2.13m) <sup>c</sup>	*	7 ft. (2.13m)
M =	Clearance under veranda, porch, deck, or balcony.	12 inches (30cm) <sup>d</sup>	*	*

a: In accordance with the current CSA B149.1 Natural Gas and Propane Installation Guide Code

b: In accordance with the current ANSI Z223.1 / NFPA 54 Natural Fuel Gas Code

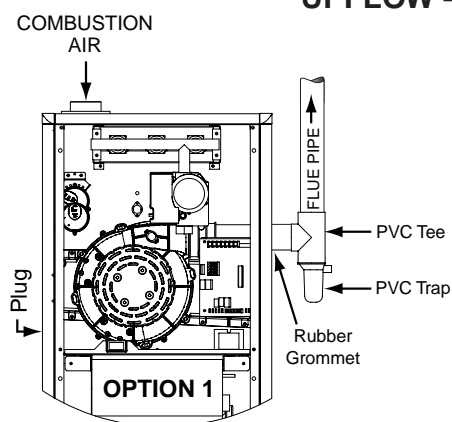
c: A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

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

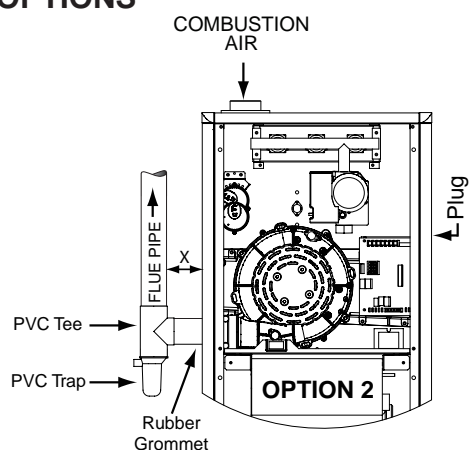
\* For clearances not specified in ANSI Z223.1 / NFPA 54 or CSA B149.1, the following statement shall be included: "Clearance in accordance with local installation codes, and the requirements of the gas supplier and the manufacturers installation instructions"

**Table 11. Vent Termination Clearances**

## UPFLOW - 1 PIPE OPTIONS

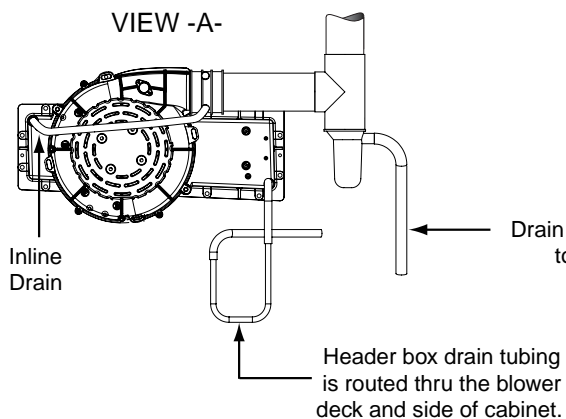


See View A for drain line positions



See View B for drain line positions

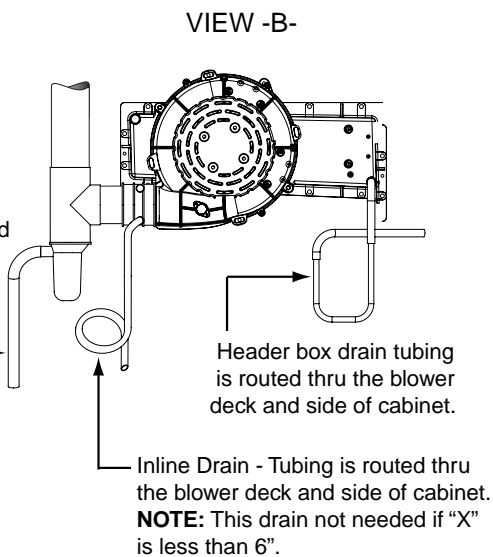
VIEW -A-



Drain Lines Attached to PVC Trap

Header box drain tubing is routed thru the blower deck and side of cabinet.

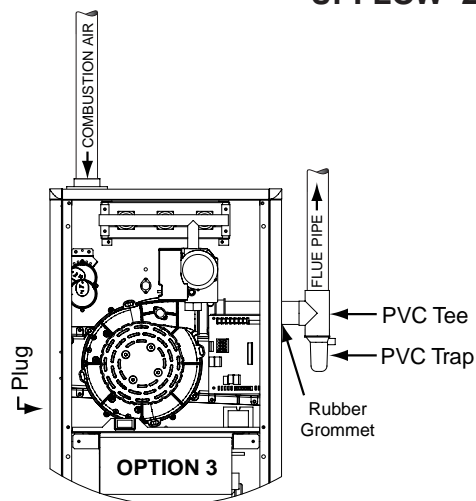
VIEW -B-



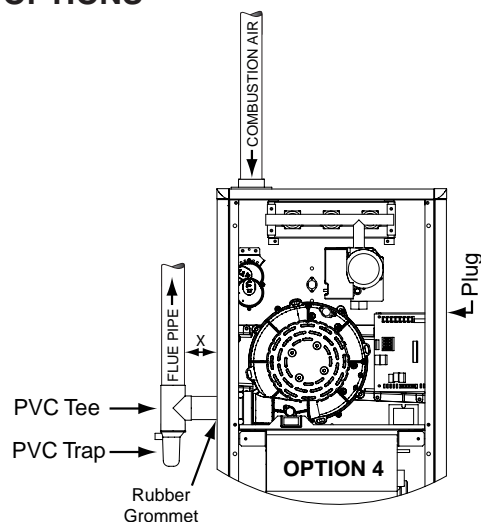
### NOTES:

- 1.) All drain lines must be trapped with J-Trap or field supplied loop.
- 2.) Drain line traps may be positioned inside or outside the cabinet.
- 3.) Inline drain tubing may need to be cut to length to resemble illustration.
- 4.) See Accessories section (pages 19-20) for optional PVC Tee configurations and drainage options.

## UPFLOW- 2 PIPE OPTIONS



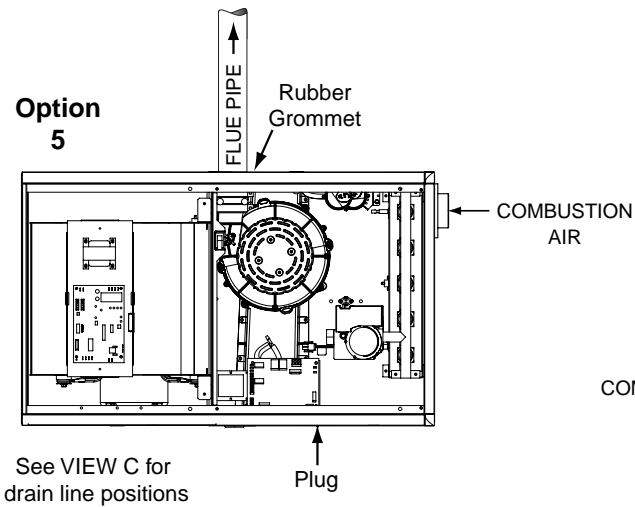
See View A for drain line positions



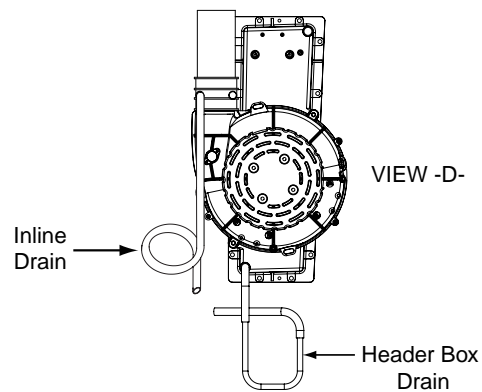
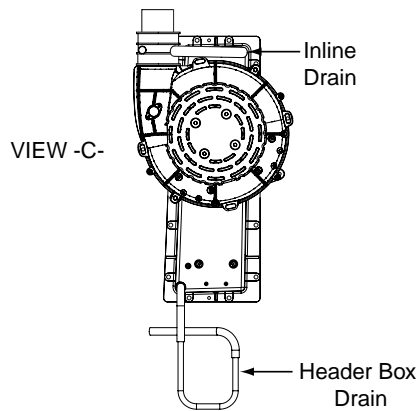
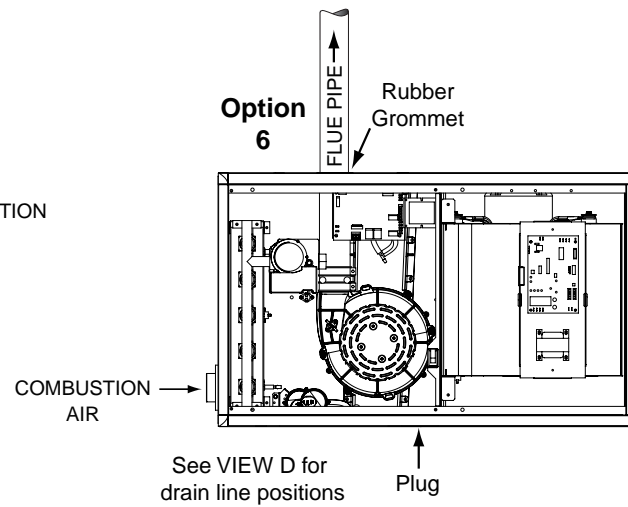
See View B for drain line positions

Figure 27. Vent Pipe & Condensate Options - Upflow Furnaces

## HORIZONTAL RIGHT - 1 PIPE OPTION



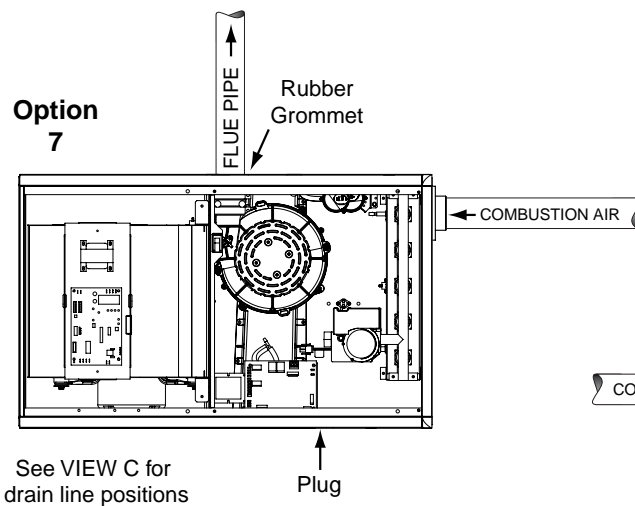
## HORIZONTAL LEFT - 1 PIPE OPTION



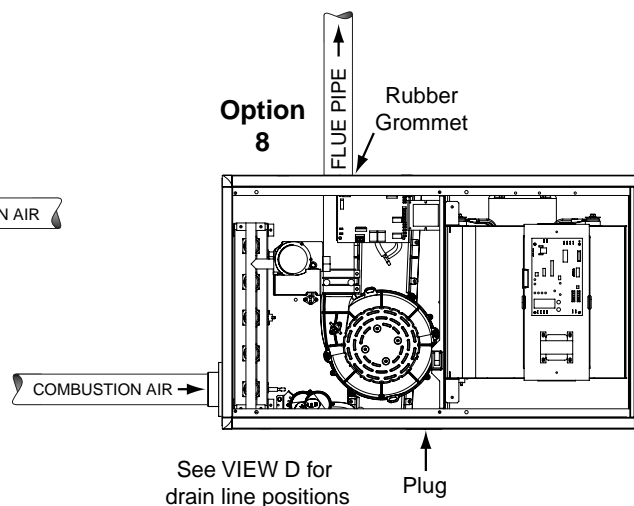
### NOTES:

- 1.) All drain lines must be trapped with J-Trap or field supplied loop.
- 2.) Inline drain tubing may need to be cut to length to resemble illustration.
- 3.) See Accessories section (pages 19-20) for optional PVC Tee configurations and drainage options.

## HORIZONTAL RIGHT - 2 PIPE OPTION

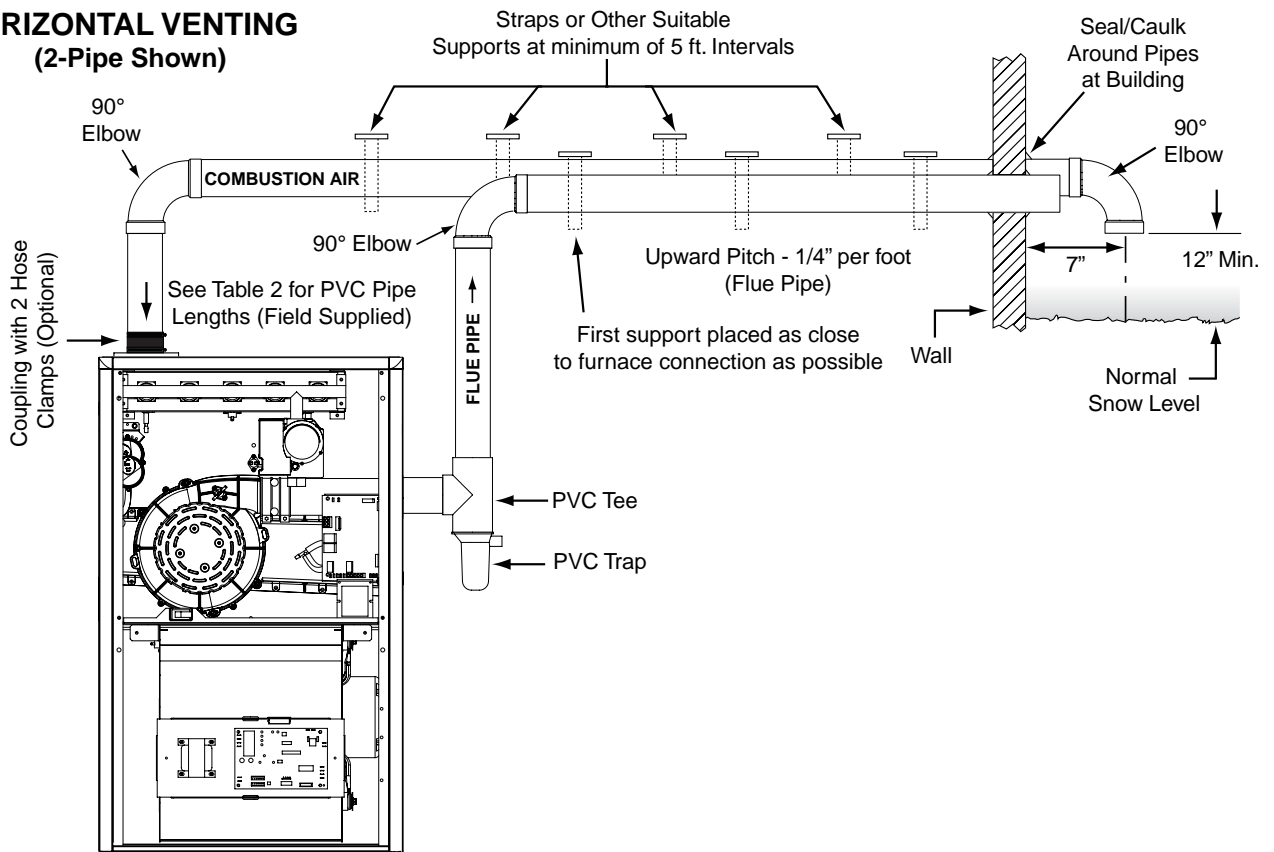


## HORIZONTAL LEFT - 2 PIPE OPTION



**Figure 28. Vent Pipe & Condensate Options - Horizontal Furnaces**

## HORIZONTAL VENTING (2-Pipe Shown)



## VERTICAL VENTING (2-Pipe Shown)

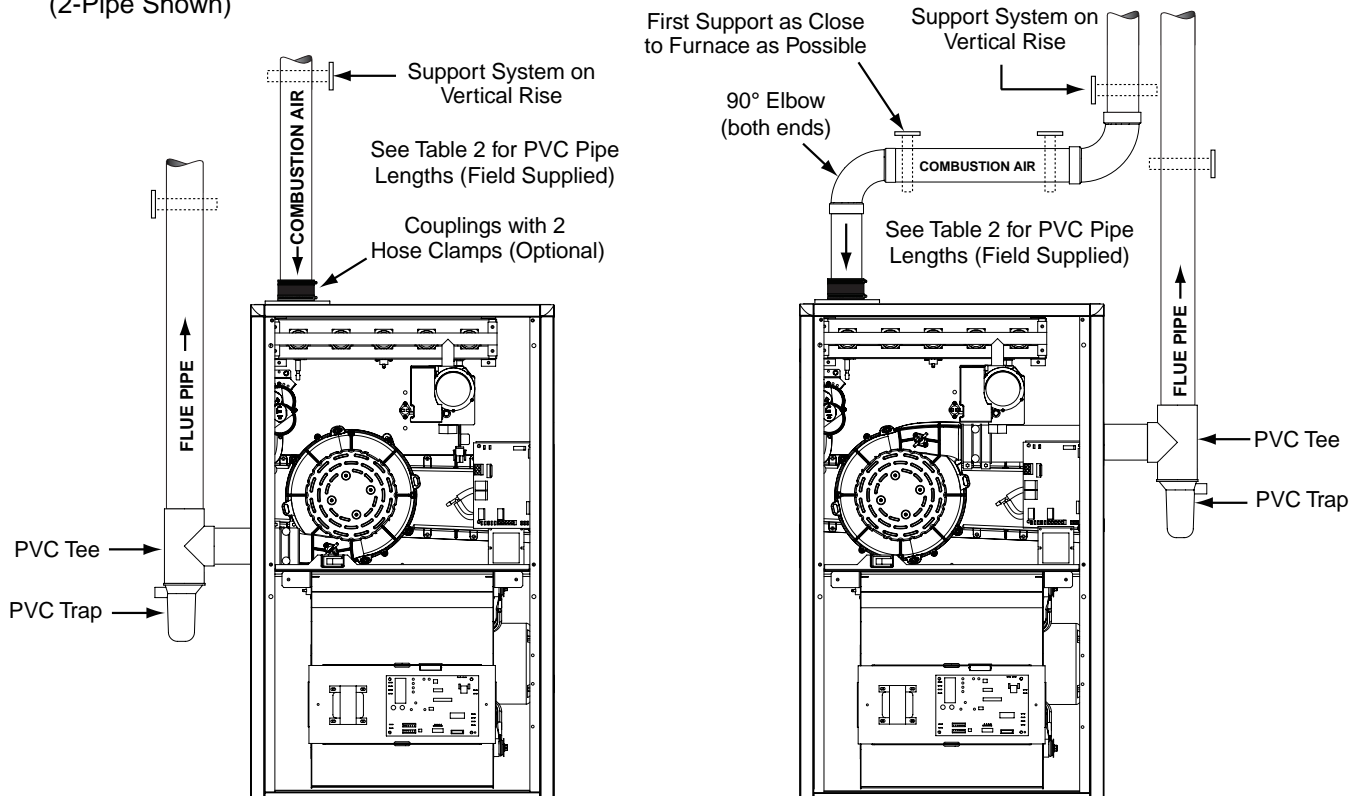


Figure 29. Horizontal & Vertical Venting Options

## FURNACE COMPONENTS

The descriptions below are various functional components that affect the operation and shutting down of this furnace. Some of these components and their locations are shown in Figure 30. If any component of the furnace must be replaced, use only factory authorized replacement parts specified in the Replacement Parts List provided online.

**Blower Limit Switch** - The Blower switch prevents furnace operation when blower is not operational.

**Condensate Drain Switch** - The Condensate Drain Switch will shut down the furnace if the condensate drain from the Collector Pan becomes clogged.

**Flame Roll-Out Switch** - The flame roll-out switch verifies that the burner flames are drawn into the heat exchanger tubes. If the burner flames are not properly drawn into the heat exchanger, the flame roll-out switch will close the gas valve and initiate the shutdown cycle.

**Flame Sensor** - The flame sensor verifies when a flame has carried over from the igniter to the opposite end burner. If no flame is detected, the furnace will shut down within 4 seconds.

**Gas Valve** - The gas valve controls the flow of gas to the burners. When the gas valve is energized it automatically opens and regulates the gas pressure in the manifold.

**Inducer Assembly** - The inducer assembly vents products of combustion to the outside.

**Pressure Switch** - Pressure switches verify that the inducer is drawing the combustion gases through the heat exchanger. If the flame is not properly drawn into the heat exchanger tube, the rollout switch or the flame sensor will shut the furnace down.

**Supply Air Limit Switch** - The supply air limit switch prevents the air temperature leaving the furnace from exceeding the maximum allowable outlet air temperature.

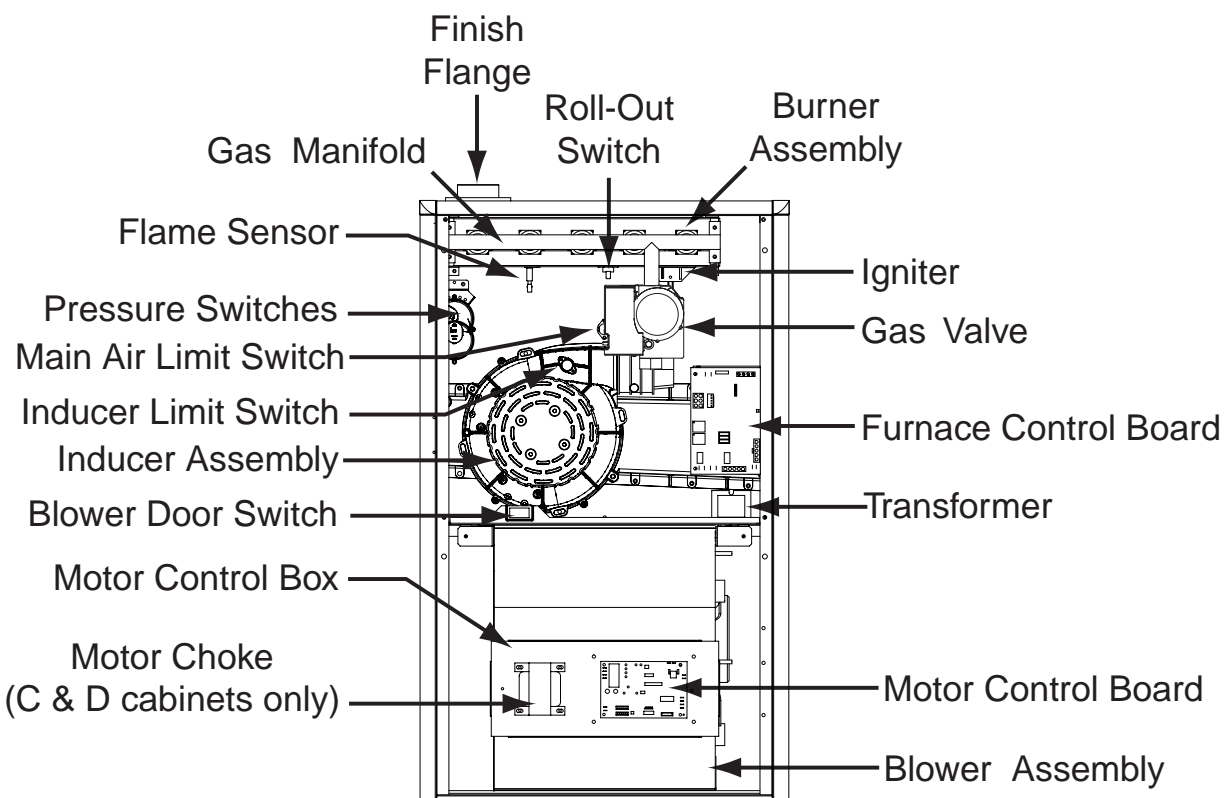


Figure 30. \*MQ Component Locations (Upflow & Horizontal)

## INSTALLATION / PERFORMANCE CHECK LIST

### ATTENTION INSTALLERS:

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the furnace or failure to follow safety warnings could result in serious injury, death, or property damage.

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

### INSTALLER NAME:

CITY:

STATE:

### INSTALLATION ADDRESS:

CITY:

STATE:

UNIT MODEL #

UNIT SERIAL #

Minimum clearances as shown in Figure 1 (page 6)?

YES

NO

Has the owner's information been reviewed with the home-owner?

YES

NO

Has the literature package been left near the furnace?

YES

NO

### WARNING:

**PROPOSITION 65 WARNING:** This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

### ELECTRICAL SYSTEM:

Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Supply Voltage: _____ VOLTS		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the heat anticipator setting correct?	YES	NO

### GAS SYSTEM:

Gas Type: (circle one)	Natural Gas	Propane
Gas pipe connections leak tested?	YES	NO
Gas Line Pressure: _____ (in - W.C.)		
Installation Altitude: _____ (FT.)		
Deration Percentage: _____ (%)		
Furnace Input: _____ (Btuh)		
Supply Air Temperature: _____ (° F)		
Return Air Temperature: _____ (° F)		
Temperature Rise: _____ (° F)		

### COMBUSTION AIR & VENTING SYSTEM:

Is there adequate fresh air supply for combustion and ventilation?	YES	NO
Vent free from restrictions?	YES	NO
Filter(s) secured in place?	YES	NO
Filter(s) clean?	YES	NO
Flue connections tight?	YES	NO
Is there proper draft?	YES	NO



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COMPLETE COMFORT. GENUINE VALUE.



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