The Signature Series is **NOT** designed for amateur installation. Installation **SHOULD** be performed by an authorized technician.
Please read this manual carefully before installation and keep it for future reference.

Owner & Installation Manual

MRCOOL®

COMFORT MADE SIMPLE

Signature Series

MGM80*SE-XA Warm Air Gas Furnace

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INSTALLATION INSTRUCTIONS

MGM80*SE*XA

Warm Air Gas Furnace

Upflow / Horizontal Left and Right Air Discharge

This manual must be left with the homeowner for future reference.

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

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WARNING

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

CAUTION

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

Manufactured By
MRCOOL, LLC
Hickory, KY 42051

P507330-02C

(P) 507330-02C

Save these instructions for future reference

Unit Dimensions

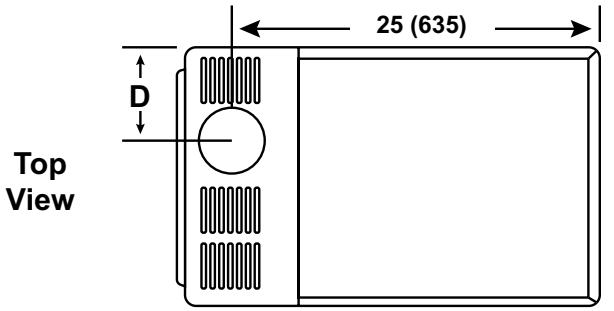
[1] **NOTE** -C*20 and D*5 size units installed in upflow applications that require air volumes of 1800 cfm (850 L/s or greater must have one of the following:

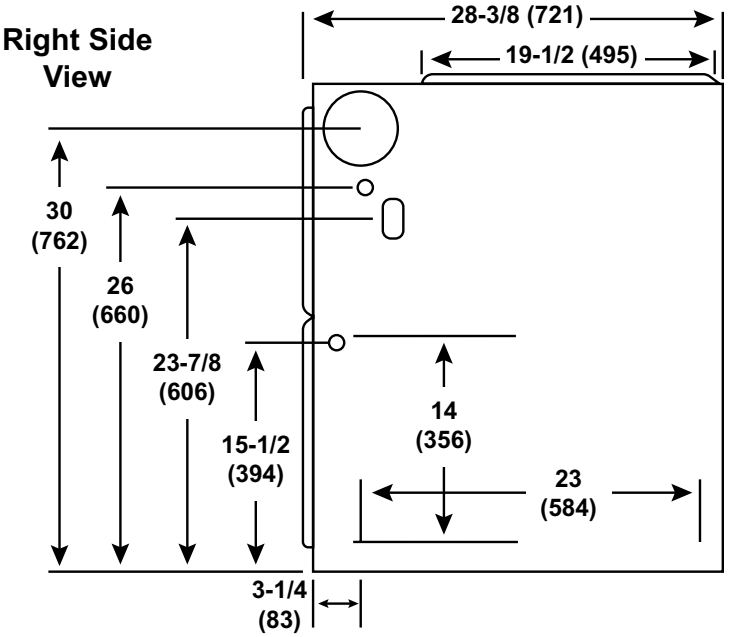
1. Single side return air with transition, to accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) air filter.
2. Single side return air with optional RAB Return Air Base
3. Bottom return air.
4. Return air from both sides.
5. Bottom and one side return air.

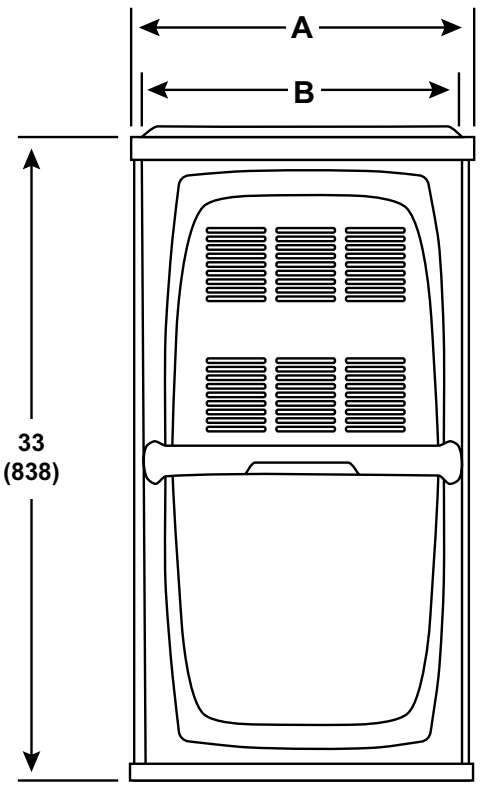
[2] Flue outlet may be horizontal but furnace must be vented vertically.

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

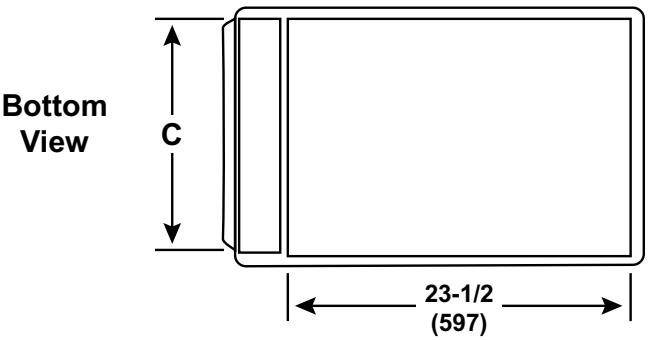
* Consider sizing requirements for optional IAQ equipment before cutting side return opening.







Front View



Capacity	A		B		C		D	
	in.	mm	in.	mm	in.	mm	in.	mm
045-3 070-3	14-1/2	368	13-3/8	340	13	330	4-3/4	121
090-4 090-5	17-1/2	446	16-3/8	416	16	406	6-1/4	159
110-5	21	533	19-7/8	504	19-1/2	495	8	203
135-5	24-1/2	622	23-3/8	546	23	584	9-3/4	248

MGM80*SE*XA Gas Furnace

The MGM80*E gas furnace is shipped ready for installation in the upflow or horizontal right position (for horizontal left position the combustion air pressure switch must be moved). The furnace is shipped with the bottom panel in place. The bottom panel must be removed if the unit is to be installed in horizontal or upflow applications with bottom return air.

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

Shipping and Packing List

1 - Assembled Gas Furnace

1 - Bag assembly containing the following:

- 2 - Screws
- 3 - Wire nuts
- 1 - Snap bushing
- 1 - Snap Plug
- 1 - Wire tie
- 1 - Vent warning label
- 1 - Owner's manual and warranty card

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

Please refer to specification sheets for available accessories.

Safety Information

⚠ DANGER

DANGER OF EXPLOSION!

There are circumstances in which odorant used with LP/Propane gas can lose its scent. In case of a leak, LP/Propane gas will settle close to the floor and may be difficult to smell. An LP/Propane leak detector should be installed in all LP applications.

Certifications

These units are CSA International certified to ANSI Z21.47.

In the USA, installation of gas furnaces must conform with local building codes. In the absence of local codes, units must be installed according to the current National Fuel Gas Code (ANSI-Z223.1). The National Fuel Gas Code is available from the following address: American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.

Clearances

Adequate clearance must be made around the air openings into the vestibule area. In order to ensure proper unit operation, combustion and ventilation air supply must be provided according to the current National Fuel Gas Code. Vent installations must be consistent with the venting tables (in this instruction) and applicable provisions of local building codes.

This furnace is CSA International certified for installation clearances to combustible material as listed on the unit nameplate and in the tables in Figure 7 and Figure 11. Accessibility and service clearances must take precedence over fire protection clearances.

Installed Locations

For installation in a residential garage, the furnace must be installed so that the burner(s) and the ignition source are located no less than 18 inches (457 mm) above the floor. The furnace must be located or protected to avoid physical damage by vehicles. When a furnace is installed in a public garage, hangar, or other building that has a hazardous atmosphere, the furnace must be installed according to recommended good practice requirements and current National Fuel Gas Code.

Temperature Rise

NOTE: *Furnace must be adjusted to obtain a temperature rise within the range specified on the unit nameplate. Failure to do so may cause erratic limit operation and may result in premature heat exchanger failure.*

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

Installed in Combination with a Cooling Coil

When this furnace is used with cooling units, it shall be installed in parallel with, or on the upstream side of, cooling units to avoid condensation in the heating compartment. See Figure 1. With a parallel flow arrangement, a damper (or other means to control the flow of air) must adequately prevent chilled air from entering the furnace. If the damper is manually operated, it must be equipped to prevent operation of either the heating or the cooling unit, unless it is in the full HEAT or COOL setting. See Figure 1.

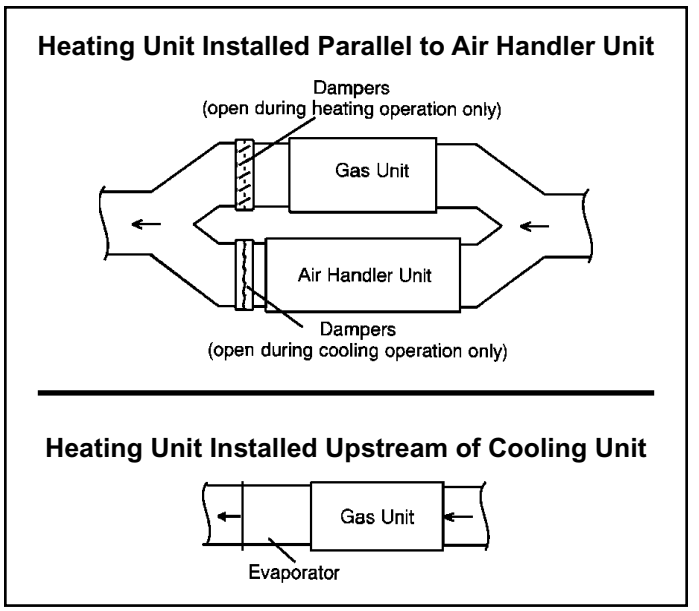


Figure 1.

When installed, this furnace must be electrically grounded according to local codes. In addition, in the United States, installation must conform with the current National Electric Code, ANSI/NFPA No. 70. The National Electric Code (ANSI/NFPA No. 70) is available from the following address:

National Fire Protection Association
1 Battery March Park
Quincy, MA 02269

NOTE: *This furnace is designed for a minimum continuous return air temperature of 60° F (16°C) or an intermittent operation down to 55° F (13°C) dry bulb for cases where a night setback thermostat is used. Return air temperature must not exceed 85° F (29°C) dry bulb.*

This furnace may be installed in alcoves, closets, attics, basements, garages, and utility rooms in the upflow or horizontal position.

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

Use of Furnace as a Construction Heater

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

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

a. Furnace must be in its final location. The vent system must be permanently installed per these installation instructions.

b. Furnace must be installed as a two pipe system and one hundred percent (100%) outdoor air must be provided for combustion air requirements during construction.

c. A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is prohibited.

d. The input rate and temperature rise must be set per the furnace rating plate.

e. Supply and Return air ducts must be provided and sealed to the furnace. Return air must be terminated outside of the space where furnace is installed.

f. Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.

g. MERV 11 or greater air filters must be installed in the system and must be regularly inspected and maintained (e.g., regular static checks and replaced at end of life) during construction.

h. Blower and vestibule access panels must be in place on the furnace at all times.

i. The furnace heat exchanger, components, duct system, and evaporator coils must be thoroughly cleaned following final construction clean−up.

j. Air filters must be replaced upon construction completion.

k. All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified in accordance with these installation instructions.

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

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

General

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

In addition to the requirements outlined previously, the following general recommendations must be considered when installing one of these furnaces:

- Place the furnace as close to the center of the air distribution system as possible. The furnace should also be located close to the chimney or vent termination point.
- Do not install the furnace where drafts might blow directly into it. This could cause improper combustion.
- Do not block the furnace combustion air openings with clothing, boxes, doors, etc. Air is needed for proper combustion and safe unit operation.
- When the furnace is installed in an attic or other insulated space, keep insulation away from the furnace.

NOTE: *The Commonwealth of Massachusetts stipulates these additional requirements:*

- Gas furnaces shall be installed by a licensed plumber or fitter only.
- The gas cock must be “T handle” type.
- When a furnace is installed in an attic, the passageway to and service area surrounding the equipment shall be floored.

Combustion, Dilution & Ventilation Air

In the past, there was no problem in bringing in sufficient outdoor air for combustion. Infiltration provided all the air that was needed. In today’s homes, tight construction practices make it necessary to bring in air from outside for combustion. Take into account that exhaust fans, appliance vents, chimneys, and fireplaces force additional air that could be used for combustion out of the house. Unless outside air is brought into the house for combustion, negative pressure (outside pressure is greater than inside pressure) will build to the point that a downdraft can occur in the furnace vent pipe or chimney. As a result, combustion gases enter the living space creating a potentially dangerous situation.

In the absence of local codes concerning air for combustion and ventilation, use the guidelines and procedures in this section to install these furnaces to ensure efficient and safe operation. You must consider combustion air needs and requirements for exhaust vents and gas piping.

A portion of this information has been reprinted with permission from the National Fuel Gas Code (ANSI-Z223.1). This reprinted material is not the complete and official position of the ANSI on the referenced subject, which is represented only by the standard in its entirety.

All gas fired appliances require air for the combustion process. If sufficient combustion air is not available, the furnace or other appliances will operate inefficiently and unsafely. Enough air must be provided to meet the needs of all fuel burning appliances and appliances such as exhaust fans which force air out of the house. When fireplaces, exhaust fans, or clothes dryers are used at the same time as the furnace, much more air is necessary to ensure proper combustion and to prevent a downdraft. Insufficient air causes incomplete combustion which can result in carbon monoxide.

⚠ WARNING

Insufficient combustion air can cause headaches, nausea, dizziness or asphyxiation. It will also cause excess water in the heat exchanger resulting in rusting and premature heat exchanger failure. Excessive exposure to contaminated combustion air will result in safety and performance related problems. Avoid exposure to the following substances in the combustion air supply:

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine base swimming pool chemicals
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Antistatic fabric softeners for clothes dryers
- Masonry acid washing materials

In addition to providing combustion air, fresh outdoor air dilutes contaminants in the indoor air. These contaminants may include bleaches, adhesives, detergents, solvents and other contaminants which can corrode furnace components.

The requirements for providing air for combustion and ventilation depend largely on whether the furnace is installed in an unconfined or a confined space.

Unconfined Space

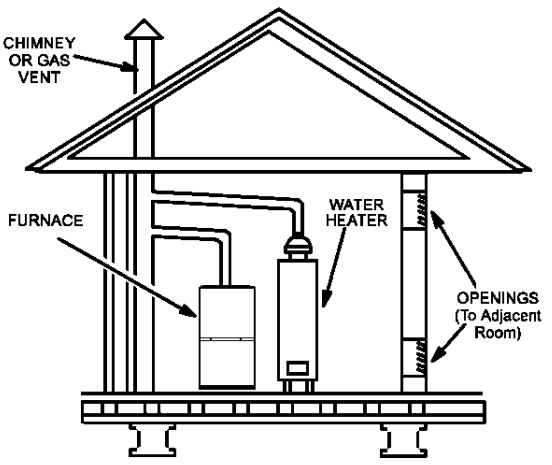
An unconfined space is an area such as a basement or large equipment room with a volume greater than 50 cubic feet (1.42 m3) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This space also includes adjacent rooms which are not separated by a door. Though an area may appear to be unconfined, it might be necessary to bring in outdoor air

for combustion if the structure does not provide enough air by infiltration. If the furnace is located in a building of tight construction with weather stripping and caulking around the windows and doors, follow the procedures in the air from outside section.

Confined Space

A confined space is an area with a volume less than 50 cubic feet (1.42 m3) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This definition includes furnace closets or small equipment rooms.

When the furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air must be handled by ducts which are sealed to the furnace casing and which terminate outside the space containing the furnace. This is especially important when the furnace is mounted on a platform in a confined space such as a closet or small equipment room. Even a small leak around the base of the unit at the platform or at the return air duct connection can cause a potentially dangerous negative pressure condition. Air for combustion and ventilation can be brought into the confined space either from inside the building or from outside.



NOTE: Each opening shall have a free area of at least one square inch per 1,000 Btu (645 mm² per .29 kW) per hour of the total input rating of all equipment in the enclosure, but not less than 100 square inches (64546 mm²).

Figure 2. Equipment in Confined Space - All Air From Inside

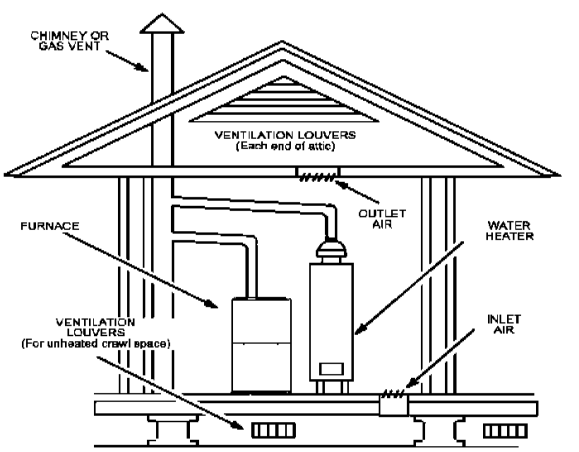
Air from Inside

If the confined space that houses the furnace adjoins a space categorized as unconfined, air can be brought in by providing two permanent openings between the two spaces. Each opening must have a minimum free area of 1 square inch (645 mm2) per 1,000 Btu (.29 kW) per hour of total input rating of all gas fired equipment in the confined space. Each opening must be at least 100 square inches (64516 mm2). One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. See Figure 2.

Air from Outside

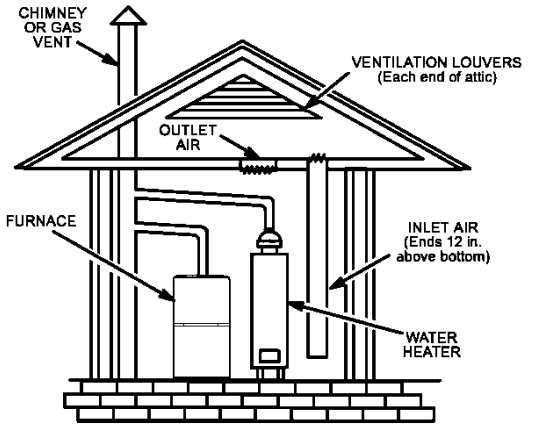
If air from outside is brought in for combustion and ventilation, the confined space must have two permanent openings. One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. These openings must communicate directly or by ducts with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors or indirectly through vertical ducts. Each opening shall have a minimum free area of 1 square inch (645 mm2) per 4,000 Btu (1.17 kW) per hour of total input rating of all equipment in the enclosure. See Figure 3 and Figure 4. When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch (645 mm2) per 2,000 Btu (.56 kW) per total input rating of all equipment in the enclosure. See Figure 5.

When ducts are used, they shall be of the same cross sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be no less than 3 inches (75 mm). In calculating free area, the blocking effect of louvers, grilles, or screens must be considered. If the design and free area of protective covering is not known for calculating the size opening required, it may be assumed that wood louvers will have 20 to 25 percent free area and metal louvers and grilles will have 60 to 75 percent free area. Louvers and grilles must be fixed in the open position or interlocked with the equipment so that they are opened automatically during equipment operation.



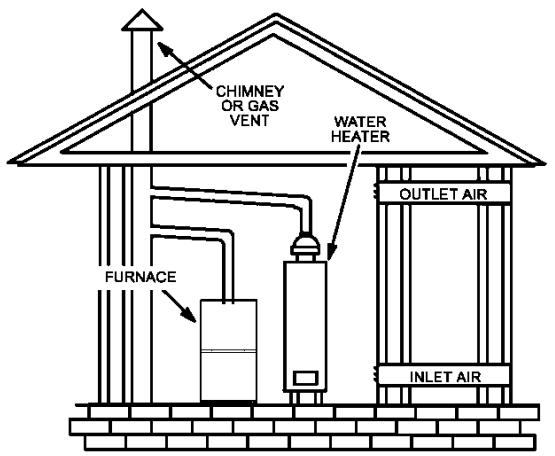
NOTE: The inlet and outlet air openings shall each have a free area of at least one square inch per 4,000 Btu (645 mm² per 1.17 kW) per hour of the total input rating of all equipment in the enclosure.

Figure 3. Equipment in Confined Space - All Air from Outside (Inlet Air from Crawl Space & Outlet Air to Ventilated Attic)



NOTE: The inlet and outlet air openings shall each have a free area of at least one square inch per 4,000 Btu (645 mm² per 1.17 kW) per hour of the total input rating of all equipment in the enclosure.

Figure 4. Equipment in Confined Space - All Air from Outside (All Air through Ventilated Attic)



NOTE: Each air duct opening shall have a free area of at least one square inch per 2,000 Btu (645 mm² per .59 kW) per hour of the total input rating of all equipment in the enclosure. If the equipment room is located against an outside wall and the air openings communicate directly with the outdoors, each opening shall have a free area of at least 1 square inch per 4,000 Btu (645 mm² per 1.17 kW) per hour of the total input rating of all other equipment in the enclosure.

Figure 5. Equipment in Confined Space - All Air from Outside

Setting Equipment

⚠ WARNING

Do not install the furnace on its front or its back. Do not connect the return air ducts to the back of the furnace. Doing so will adversely affect the operation of the safety control devices, which could result in personal injury or death.

The gas furnace can be installed as shipped in either the upflow position or the horizontal position.

Select a location that allows for the required clearances that are listed on the unit nameplate. Also consider gas supply connections, electrical supply, vent connection, and installation and service clearances [24 inches (610 mm) at unit front]. The unit must be level.

NOTE: *Units with 1/2 hp and 3/4 hp blower motors are equipped with three flexible legs and one rigid leg. See Figure 6. The rigid leg is equipped with a shipping bolt and a flat white plastic washer (rather than the rubber mounting grommet used with a flexible mounting leg). The bolt and washer must be removed before the furnace is placed into operation. After the bolt and washer have been removed, the rigid leg will not touch the blower housing.*

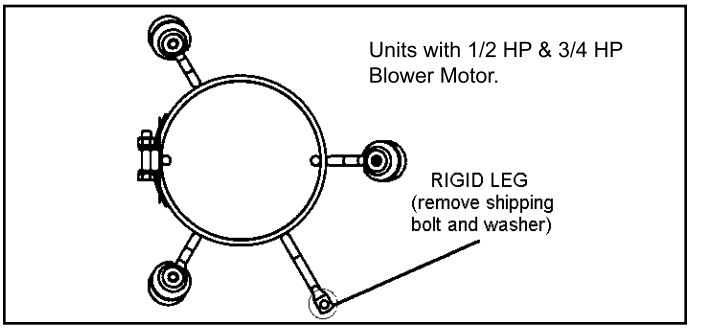
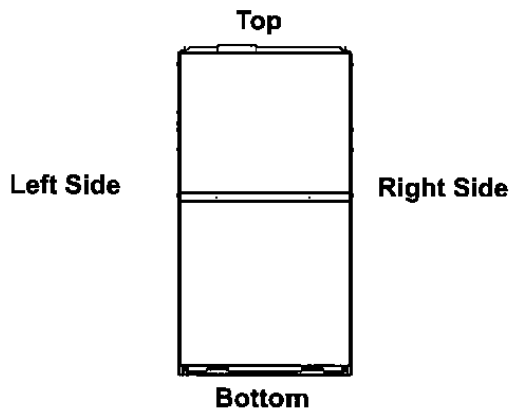


Figure 6.

Upflow Applications

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in Figure 7.



Type of Vent Connector	Type C	Type B[1]
Top	1 in. (25 mm)	1 in. (25 mm)
*Front	2-1/4 in. (57 mm)	2-1/4 in. (57 mm)
Back	0	0
Sides	0†	0
Vent	6 in. (152 mm)	1 in. (25 mm)
Floor	0‡	0‡

* Front clearance in alcove installation must be 24 in. (610 mm). Maintain a minimum of 24 in. (610 mm) for front service access.

‡ For installation on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.

† Left side requires 3 in. if a single wall vent is used on 14-1/2 in. cabinets.

Figure 7. Upflow Application Installation Clearances

Return Air - Upflow Applications

Return air can be brought in through the bottom or either side of the furnace installed in an upflow application. If the furnace is installed on a platform with bottom return, make an airtight seal between the bottom of the furnace and the platform to ensure that the furnace operates properly and safely. The furnace is equipped with a removable bottom panel to facilitate installation.

Markings are provided on both sides of the furnace cabinet for installations that require side return air. Cut the furnace cabinet at the maximum dimensions shown on Page 2.

NOTE: *20C and 20D units that require air volumes over 1800 cfm (850 L/s) must have one of the following:*

1. Single side return air with transition to accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter. (Required to maintain proper air velocity.) See Figure 8.
2. Single side return air with optional return airbase. See Figure 12.
3. Bottom return air.
4. Return air from both sides.
5. Bottom and one side return air.

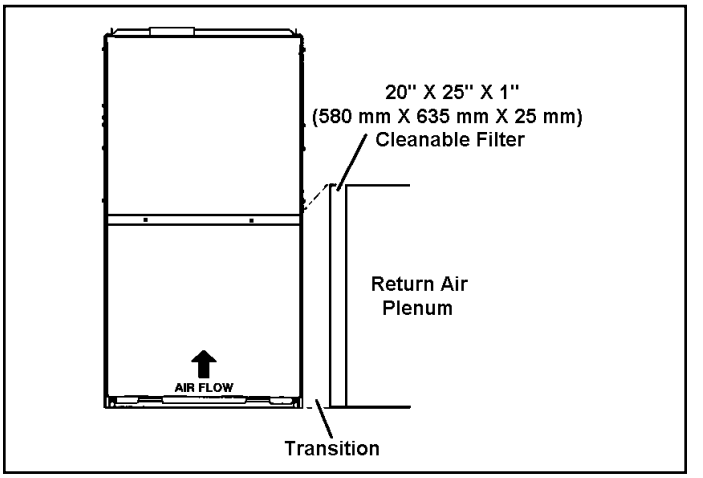


Figure 8. Single Side Return Air (with transition and filter)

Removing the Bottom Panel

Remove the two screws that secure the bottom cap to the furnace. Pivot the bottom cap down to release the bottom panel. Once the bottom panel has been removed, reinstall the bottom cap. See Figure 9.

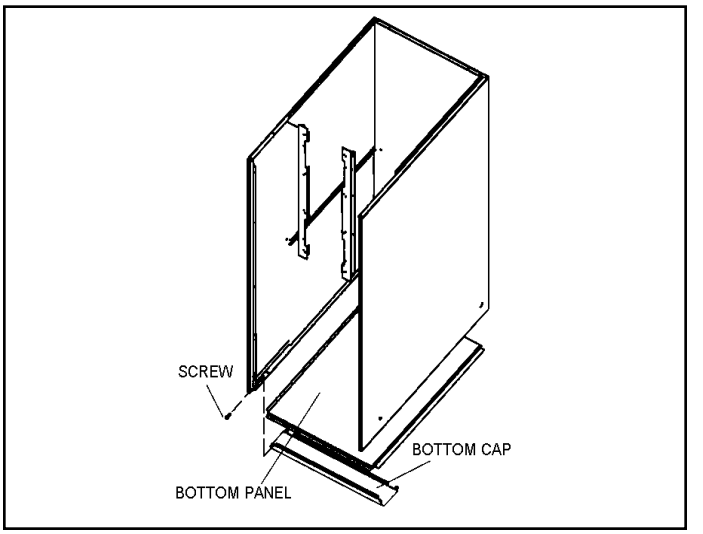


Figure 9. Removing the Bottom Panel

Horizontal Applications

The furnace can be installed in horizontal applications. Order horizontal suspension kit (51W10) from HVAC Distributing, or use equivalent suspension method.

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in Figure 11.

This furnace may be installed in either an attic or a crawl space. Either suspend the furnace from roof rafters or floor joists, as shown in Figure 10, or install the furnace on a platform, as shown in Figure 13.

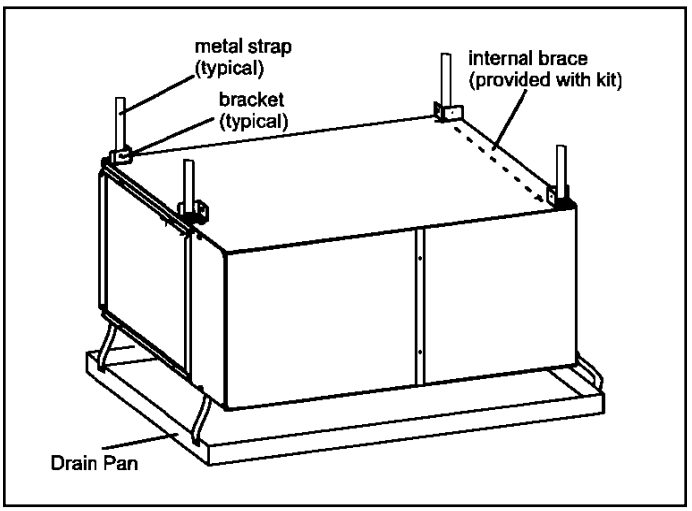
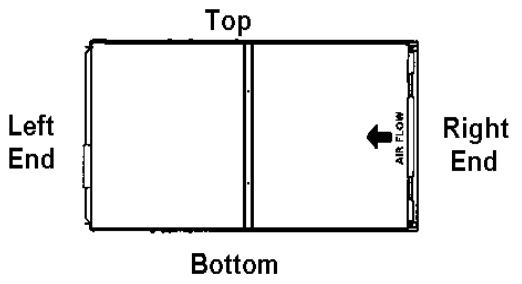


Figure 10. Typical Horizontal Application Unit Suspended in Attic or Crawl Space

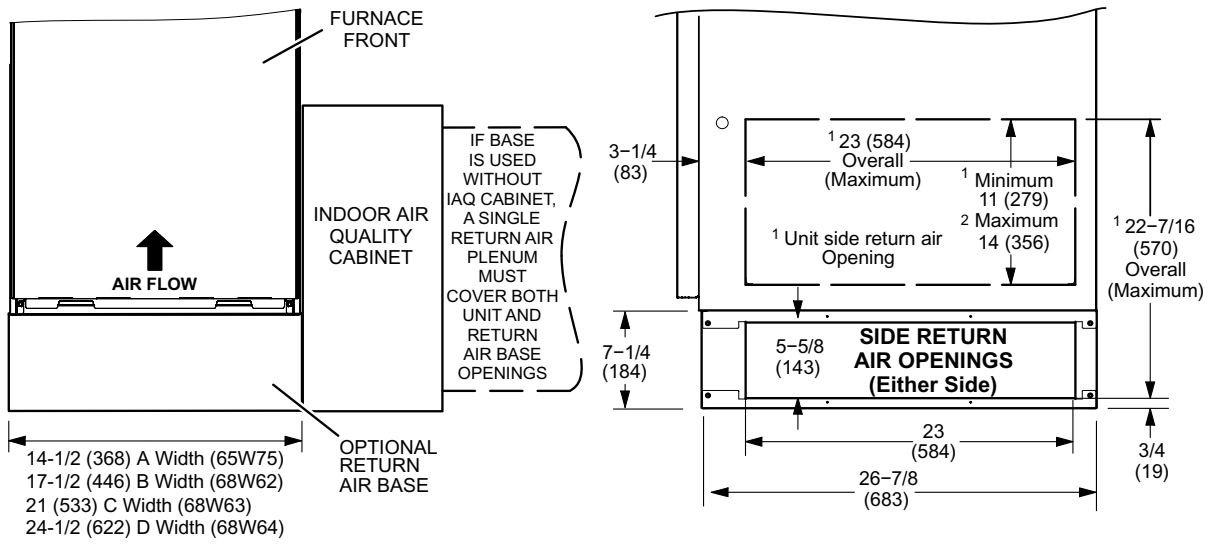


Type of Vent Connector	Type C	Type B[1]
Top	0	0
*Front	2-1/4 in. (57 mm)	2-1/4 in. (57 mm)
Back	0	0
Ends	2 in. (51 mm)	2 in. (51 mm)
Vent	6 in. (152 mm)	1 in. (25 mm)
Floor	0‡	0‡

* Front clearance in alcove installation must be 24 in. (610 mm). Maintain a minimum of 24 in. (610 mm) for front service access.

‡ For installation on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.

Figure 11. Horizontal Application Installation Clearances



FRONT VIEW **SIDE VIEW**

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

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

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

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

Side return air openings must be cut in the field. There are cutting guides stenciled on the cabinet for the side return air opening.

The size of the opening must not extend beyond the markings on the furnace cabinet.

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

Figure 12. Optional Return Air Base (Upflow Applications Only - For Use with A, B, C and D Cabinets)

NOTE: *Heavy gauge perforated sheet metal straps may be used to suspend the unit from roof rafters or ceiling joists. When straps are used to suspend the unit in this way, support must be provided for both the ends. The straps must not interfere with the plenum or exhaust piping installation. Cooling coils and supply and return air plenums must be supported separately.*

NOTE: *When the furnace is installed on a platform in a crawlspace, it must be elevated enough to avoid water damage and to allow the evaporator coil to drain.*

Return Air - Horizontal Applications

Return air must be brought in through the end of a furnace installed in a horizontal application. The furnace is equipped with a removable bottom panel to facilitate installation. See Figure 9.

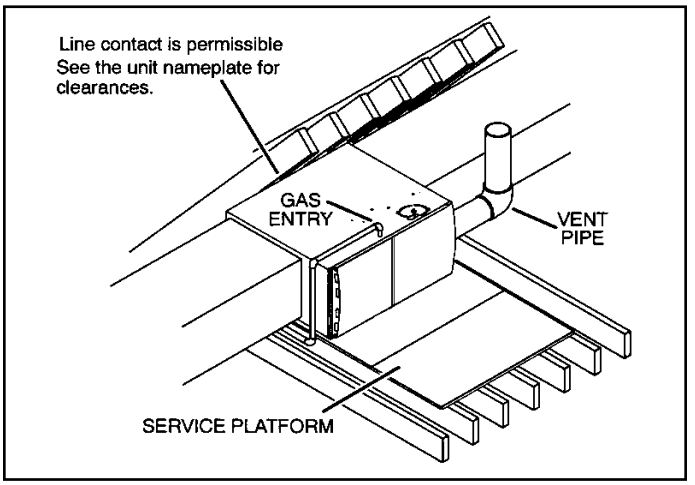


Figure 13. Horizontal Application Unit Installed on Platform

⚠ WARNING

Improper installation of the furnace can result in personal injury or death. Combustion and flue products must never be allowed to enter the return air system or the living space. Use screws and joint tape to seal the return air system to the furnace.

In platform installations with bottom return air, the furnace should be sealed airtight to the return air plenum. A door must never be used as a portion of the return air duct system. The base must provide a stable support and an airtight seal to the furnace. Allow absolutely no sagging, cracks, gaps, etc..

The return and supply air duct systems must never be connected to or from other heating devices such as a fireplace or stove, etc.. Fire, explosion, carbon monoxide poisoning, personal injury and/or property damage could result.

⚠ WARNING

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

Filters

This unit is not equipped with a filter or rack. A field provided high velocity filter is required for the unit to operate properly. Table 1 lists recommended filter sizes.

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

Furnace Cabinet Width	Filter Size	
	Side Return	Bottom Return
A - 14-1/2”	16 x 25 x 1	14 x 25 x 1
B - 17-1/2”		16 x 25 x 1
C - 21”		20 x 25 x 1
D - 24-1/2”		24 x 25 x 1

Table 1.

Duct System

Use industry approved standards (such as those published by Air Conditioning Contractors of America or American Society of Heating, Refrigerating and Air Conditioning Engineers) to size and install the supply and return air duct system. This will result in a quiet and low static system that has uniform air distribution.

NOTE: *Do not operate the furnace in the heating mode with an external static pressure that exceeds 0.8 inches w.c. Higher external static pressures may cause erratic limit operation.*

Supply Air Plenum

If the furnace is installed without a cooling coil, a removable access panel must be installed in the supply air duct. The access panel should be large enough to permit inspection (either by smoke or reflected light) of the heat exchanger for leaks after the furnace is installed. The furnace access panel must always be in place when the furnace is operating and it must not allow leaks into the supply air duct system.

Return Air Plenum

NOTE: *Return air must not be drawn from a room where this furnace, or any other gas fueled appliance (i.e., water heater), or carbon monoxide producing device (i.e., wood fireplace) is installed.*

When return air is drawn from a room, a negative pressure is created in the room. If a gas appliance is operating in a room with negative pressure, the flue products can be pulled back down the vent pipe and into the room. This reverse flow of the flue gas may result in incomplete combustion and the formation of carbon monoxide gas. This toxic gas might then be distributed throughout the house by the furnace duct system.

In upflow applications, the return air can be brought in through the bottom or either side of the furnace. If a furnace with bottom return air is installed on a platform, make an airtight seal between the bottom of the furnace and the platform to ensure that the unit operates properly and safely. Use fiberglass sealing strips, caulking, or equivalent sealing method between the plenum and the furnace cabinet to ensure a tight seal. If a filter is installed, size the return air duct to fit the filter frame.

Venting

A 4 inch diameter flue transition is factory installed on the combustion air inducer outlet of all models. Figure 15 shows the combustion air inducer as shipped from the factory.

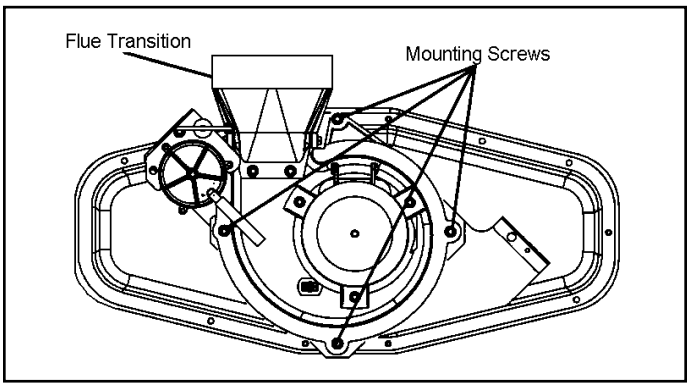


Figure 14. Mounting Screws Location

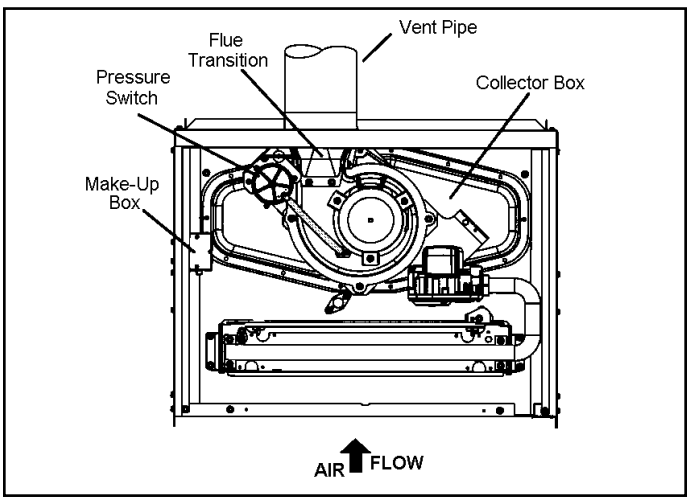


Figure 15. Upflow Position
Top Vent Discharge

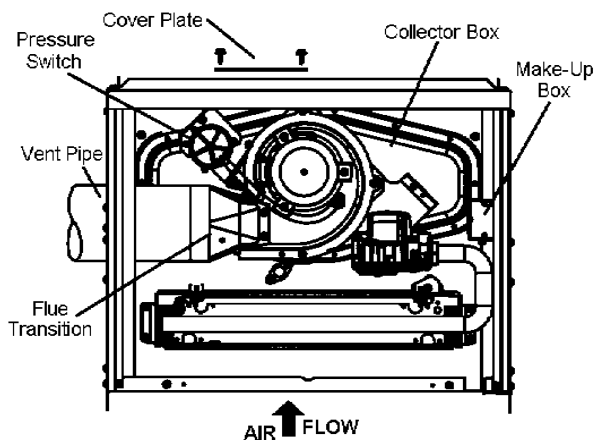
IMPORTANT

The unit will not vent properly with the flue transition pointed down in the 6 o'clock position.

The combustion air inducer may be rotated clockwise or counterclockwise by 90° to allow for top or side vent discharge in all applications. When the unit is installed, the flue transition must be in the 9 o'clock, 12 o'clock or 3 o'clock position.

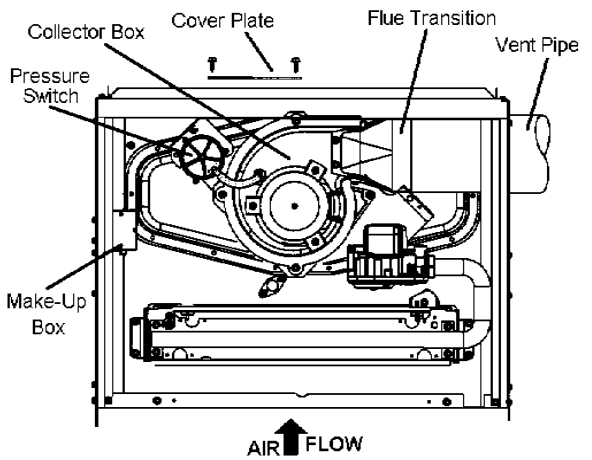
If necessary reposition the combustion air inducer, pressure switch and/or make-up box as needed per the following steps. See Figure 15 through Figure 21.

1. Remove the four mounting screws (Figure 14) which secure the combustion air inducer / pressure switch assembly to the orifice plate. Lift the assembly and rotate it 90° clockwise or counter clockwise to either the 3 o'clock position. Resecure with four screws. Gasket should be left in place.
2. Use tin snips to cut preferred opening on the cabinet for repositioning the flue outlet. Use the cut-out piece as a cover plate to patch unused opening on cabinet.



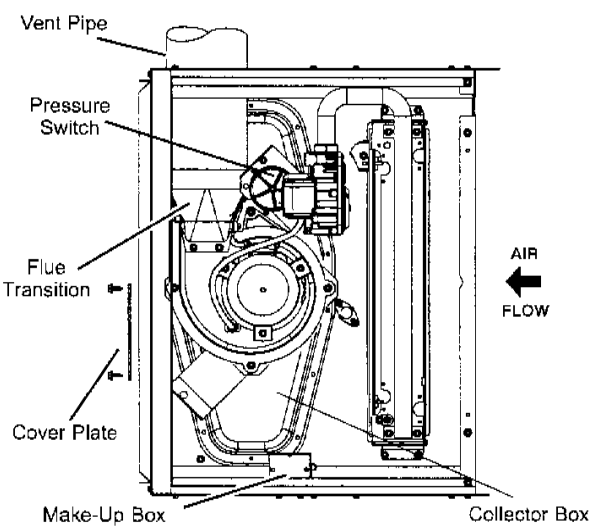
- Gas supply piping must be brought into the unit from the right side in order to accommodate the flue pipe.
- Cut combustion air inducer tubing from 9" to 8" to avoid interference with inducer motor.
- Remove make-up box assembly (2 screws) and cut wire tie to free make-up box wires. Re install make-up box on other side of cabinet.
- Resecure make-up box wires: Either pull excess wires through the blower compartment and secure using supplied wire tie, or coil excess wire and secure to the gas manifold.

Figure 16. Upflow Position
Left Side Vent Discharge



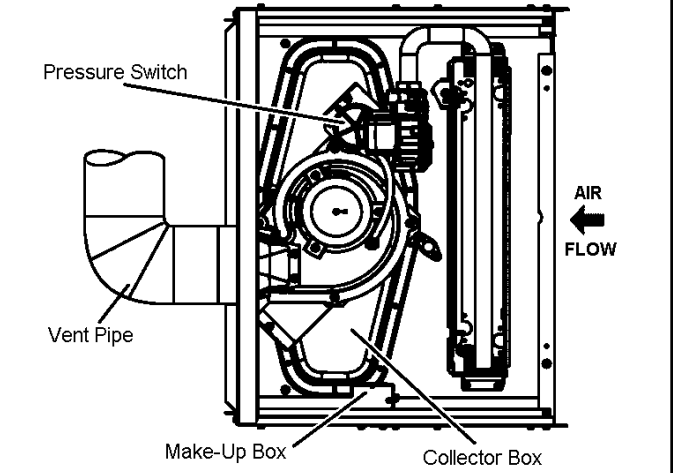
- Cut combustion air inducer tubing from 9” to 5” to avoid interference with inducer motor.

Figure 17. Upflow Position Right Side Vent Discharge



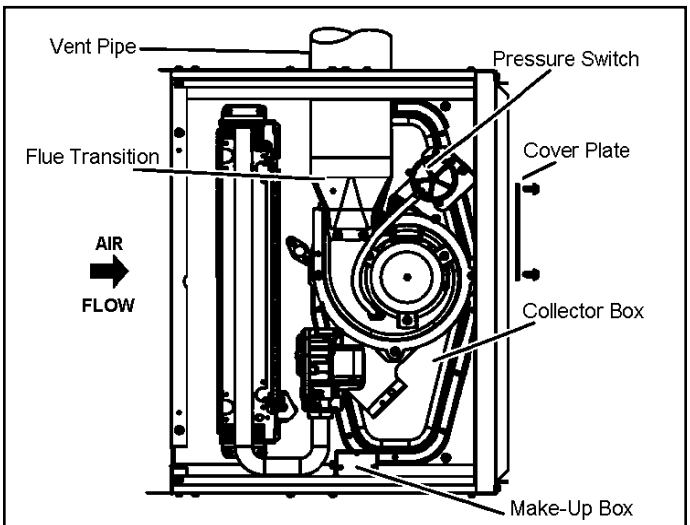
- Disconnect pressure switch hose from barbed fitting on the pressure switch assembly. Remove pressure switch assembly (1 screw) and cut wire tie to free pressure switch wires. Reinstall pressure switch on the other side of orifice plate and reconnect pressure switch hose.
- Resecure pressure switch wires: Either pull excess wires through the blower compartment and secure using supplied wire tie, or coil excess wire and secure to the gas manifold.

Figure 18. Horizontal Left Position Top Vent Discharge



- Cut combustion air inducer tubing from 9” to 7” to avoid interference with inducer motor.
- Disconnect pressure switch hose from barbed fitting on the pressure switch assembly. Remove pressure switch assembly (1 screw) and cut wire tie to free pressure switch wires. Reinstall pressure switch on the other side of orifice plate and reconnect pressure switch hose.
- Resecure pressure switch wires: Either pull excess wires through the blower compartment and secure using supplied wire tie, or coil excess wire and secure to the gas manifold.

Figure 19. Horizontal Left Position Side Vent Discharge



- Gas supply piping must be brought into the unit from the bottom in order to accommodate the flue pipe.
- Cut combustion air inducer tubing from 9” to 8” to avoid interference with inducer motor.
- Remove make-up box assembly (2 screws) and cut wire tie to free make-up box wires. Reinstall make-up box on other side of cabinet.
- Resecure make-up box wires: Either pull excess wires through the blower compartment and secure using supplied wire tie, or coil excess wire and secure to the gas manifold.

Figure 20. Horizontal Right Position Top Vent Discharge

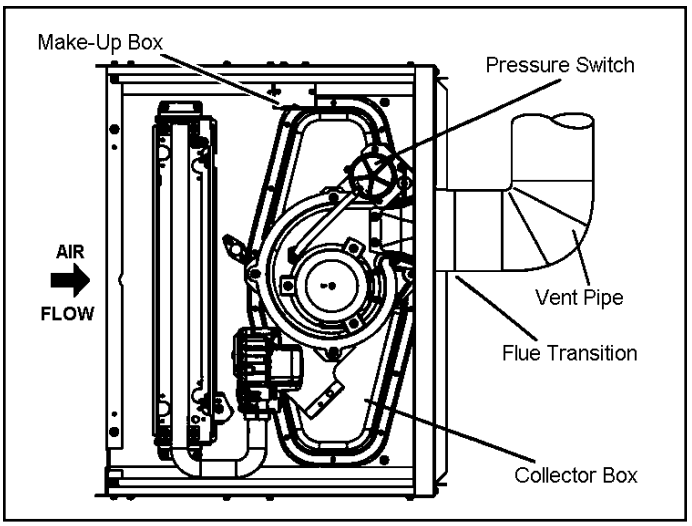


Figure 21. Horizontal Right Position Side Vent Discharge

These series units are classified as fan assisted Category I furnaces when vertically vented according to the latest edition of National Fuel Gas Code (NFPA 54 / ANSI Z223.1) in the USA. A fan assisted Category I furnace is an appliance equipped with an integral mechanical means to either draw or force combustion products through the combustion chamber and/or heat exchanger. This unit is not approved for use with horizontal venting.

NOTE: *Use these instructions as a guide. They do not supersede local codes. This furnace must be vented according to all local codes these installation instructions, and the provided venting tables in these instructions.*

The venting tables in this manual were extracted from the National Fuel Gas Code (NFPA 54 / ANSI Z223.1) and are provided as a guide for proper vent installation. Proper application, termination, construction and location of vents must conform to local codes having jurisdiction. In the absence of local codes, the NFGC serves as the defining document.

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

⚠ IMPORTANT

Once the venting system is installed, attach the “Disconnected Vent” warning sticker to a visible area of the plenum near the vent pipe. See Figure 22. The warning sticker is provided in the bag assembly. Order kit 66W04 for additional stickers.

⚠ WARNING

Asphyxiation hazard. The exhaust vent for this furnace must be securely connected to the furnace flue transition at all times.

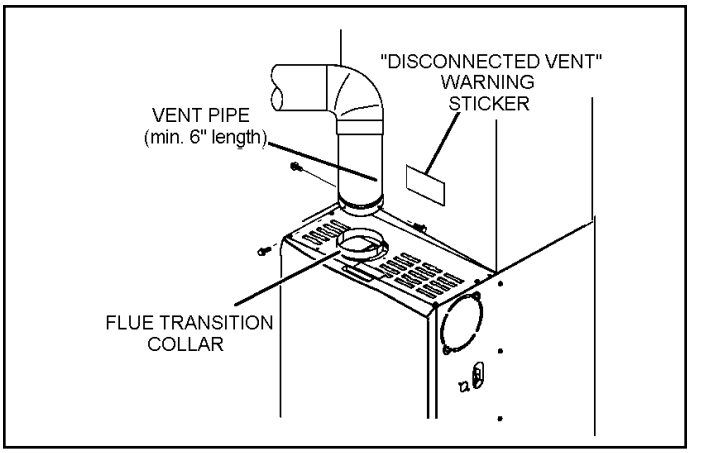


Figure 22. Vent Connection

Use self drilling sheet metal screws or a mechanical fastener to firmly secure the vent pipe to the round collar of the flue transition. If self drilling screws are used to attach the vent pipe, it is recommended that three be used. Drive one self drilling screw through the front and one through each side of the vent pipe and collar. See Figure 22.

Install the first vent connector elbow at a minimum of six inches (152 mm) from the furnace vent outlet. See Figure 22.

Venting Using a Masonry Chimney

The following additional requirements apply when a lined masonry chimney is used to vent this furnace.

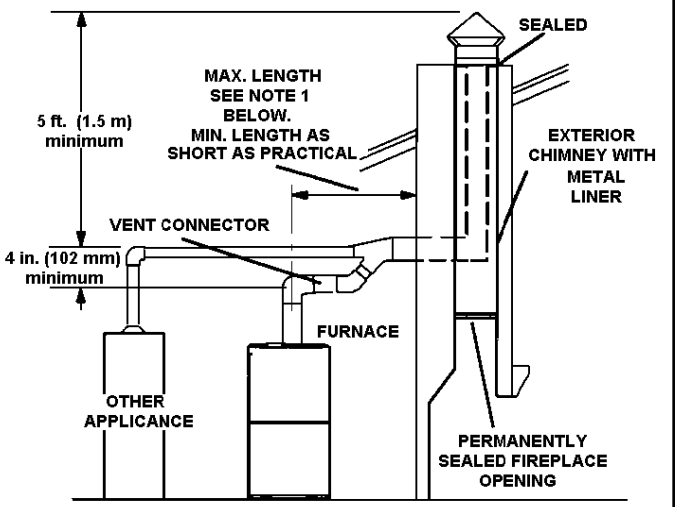
Masonry chimneys used to vent Category I central furnaces must be either tile lined or lined with a listed metal lining system or dedicated gas vent. Unlined masonry chimneys are prohibited. See Figure 23 and Figure 24 for common venting.

A chimney with one or more sides exposed to the outside of the structure is considered to be an exterior chimney.

An exterior masonry chimney that is not tile lined must be lined with B1 vent or a listed insulated flexible metal vent. An exterior tile lined chimney that is sealed and capped may be lined with a listed uninsulated flexible metal vent.

If the existing chimney will not accommodate a listed metal liner, either the chimney must be rebuilt to accommodate one of these liners or an alternate approved venting method must be found.

Insulation for the flexible vent pipe must be an encapsulated fiberglass sleeve recommended by the flexible vent pipe manufacturer.



NOTE 1: *Refer to the provided venting tables for installations. Refer to the capacity requirements shown in the provided venting tables.*

Figure 23. Common Venting Using Metal-Lined Masonry Chimney

DO NOT insulate the space between the liner and the chimney wall with puffed mica or any other loose granular insulating material.

⚠ IMPORTANT

SINGLE appliance venting of a fan assisted furnace into a tile lined masonry chimney (interior or outside wall) is prohibited. The chimney must first be lined with either type B1 vent or an insulated single wall flexible vent lining system which has been sized according to the provided venting tables and the vent pipe manufacturer's instructions.

A fan assisted furnace may be commonly vented into an existing lined masonry chimney if the following conditions are met:

- The chimney is currently serving at least one drafthood equipped appliance.
- The vent connectors and chimney are sized according to the provided venting tables.

If type B1 double wall vent is used inside a chimney, no other appliance can be vented into the chimney. The outer wall of type B1 vent pipe must not be exposed to flue products. A type B1 vent or masonry chimney liner shall terminate above the roof surface with a listed cap or a listed roof assembly according to the terms of their respective listings and the vent manufacturer's instructions.

When inspection reveals that an existing chimney is not safe for the intended purpose, it shall be rebuilt to conform to nationally recognized standards, lined or relined with suitable materials, or replaced with a gas vent or chimney suitable for venting. The chimney passageway must be checked periodically to ensure that it is clear and free of obstructions.

Do not install a manual damper, barometric draft regulator, or flue restrictor between the furnace and the chimney.

Never connect a Category I appliance to a chimney that is servicing a solid fuel appliance. If a fireplace chimney flue is used to vent this appliance, the fireplace opening must be permanently sealed.

A type B1 or listed chimney lining system that passes through an unused masonry chimney flue is not considered to be exposed to the outdoors.

General Venting Requirements

Vent all furnaces according to these instructions:

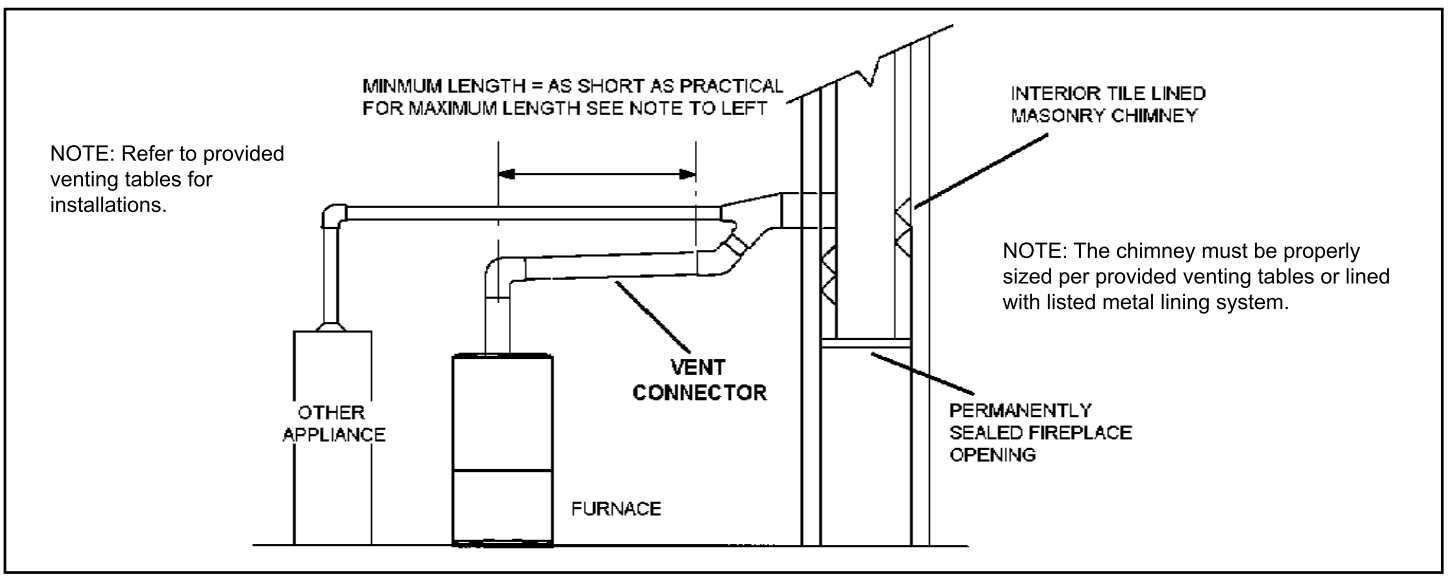


Figure 24. Common Venting Using Tile Lined Interior Masonry Chimney and Combined Vent Connector

1. Vent diameter recommendations and maximum allowable piping runs are found in the provided venting tables.
2. In no case should the vent or vent connector diameter be less than the diameter specified in the provided venting tables.
3. The minimum vent capacity determined by the sizing tables must be less than the low fire input rating and the maximum vent capacity must be greater than the high fire input rating.
4. Single appliance vents - If the vertical vent or tile lined chimney has a larger diameter or flow area than the vent connector, use the vertical vent diameter to determine the minimum vent capacity and the vent connector diameter to determine the maximum vent capacity. The flow area of the vertical vent, however, shall not exceed 7 times the flow area of the listed appliance categorized vent area, drafthood outlet area or flue collar area unless designed according to approved engineering methods.
5. Multiple appliance vents - The flow area of the largest section of vertical vent or chimney shall not exceed 7 times the smallest listed appliance categorized vent area, drafthood outlet area or flue collar area unless designed according to approved engineering methods.
6. The entire length of single wall metal vent connector shall be readily accessible for inspection, cleaning, and replacement.
7. Single appliance venting configurations with zero lateral lengths (Table 3) are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10% (0.90 x maximum listed capacity).
8. The common venting tables (Table 4 and Table 5) were generated using a maximum horizontal vent connector length of 1-1/2 feet (.46 m) for each inch (25 mm) of connector diameter as follows:

Connector Diameter in. (mm)	Maximum Horizontal Connector Length ft. (m)
3 (76)	4-1/2 (1.37)
4 (102)	6 (1.83)
5 (127)	7-1/2 (2.29)
6 (152)	9 (2.74)
7 (178)	10-1/2 (3.20)

Table 2.

9. If the common vertical vent is offset, the maximum common vent capacity listed in the common venting tables should be reduced by 20%, the equivalent of two 90° elbows (0.80 x maximum common vent capacity). The horizontal length of the offset shall not exceed 1-1/2 feet (.46 m) for each inch (25 mm) of common vent diameter.
10. The vent pipe should be as short as possible with the least number of elbows and angles required to complete the job. Route the vent connector to the vent using the shortest possible route.
11. A vent connector shall be supported without any dips or sags and shall slope a minimum of 1/4 inch (6.4 mm) per linear foot (305 mm) of connector, back toward the appliance.
12. Vent connectors shall be firmly attached to the furnace flue collar by self drilling screws or other approved means,except vent connectors of listed type B vent material which shall be assembled according to the manufacturer's instructions. Joints between sections of single wall connector piping shall be fastened by screws or other approved means.
13. When the vent connector used for Category I appliances must be located in or pass through a crawl space, attic or other areas which may be cold, that portion of the vent connector shall be constructed of listed double wall type B vent material or material having equivalent insulation qualities.
14. All venting pipe passing through floors, walls, and ceilings must be installed with the listed clearance to combustible materials and be fire stopped according to local codes. In absence of local codes, refer to NFGC (2223.1).
15. No portion of the venting system can extend into, or pass through any circulation air duct or plenum.
16. Vent connectors serving Category I appliances shall not be connected to any portion of mechanical draft systems operating under positive pressure such as Category III or IV venting systems.
17. If vent connectors are combined prior to entering the common vent, the maximum common vent capacity listed in the common venting tables must be reduced by 10%, the equivalent of one 90° elbow (0.90 x maximum common vent capacity).
18. The common vent diameter must always be at least as large as the largest vent connector diameter.
19. In no case, shall the vent connector be sized more than two consecutive table size diameters over the size of the draft hood outlet or flue collar outlet.
20. Do not install a manual damper, barometric draft regulator or flue restrictor between the furnace and the chimney.
21. When connecting this appliance to an existing dedicated or common venting system, you must inspect the venting system's general condition and look for signs of corrosion. The existing vent pipe size must conform to these instructions and the provided venting tables. If the existing venting system does not meet these requirements, it must be resized.

Capacity of Type B Double Wall Vents with Type B Double Wall Connectors Serving a Single Category I Appliance

Height H (feet)	Lateral L (feet)	Vent and Connector Diameter - D (inches)							
		3 inch		4 inch		5 inch		6 inch	
		Appliance Input Rating in Thousands of Btu per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	0	0	78	0	152	0	251	0	375
	2	13	51	18	97	27	157	32	232
	4	21	49	30	94	39	153	50	227
	6	25	46	36	91	47	149	59	223
8	0	0	84	0	165	0	276	0	415
	2	12	57	16	109	25	178	28	263
	5	23	53	32	103	42	171	53	255
	8	28	49	39	98	51	164	64	247
10	0	0	88	0	175	0	295	0	447
	2	12	61	17	118	23	194	26	289
	5	23	57	32	113	41	187	52	280
	10	30	51	41	104	54	176	67	267
15	0	0	94	0	191	0	327	0	502
	2	11	69	15	136	20	226	22	339
	5	22	65	30	130	39	219	49	330
	10	29	59	40	121	51	206	64	315
	15	35	53	48	112	61	195	76	301
20	0	0	97	0	202	0	349	0	540
	2	10	75	14	149	18	250	20	377
	5	21	71	29	143	38	242	47	367
	10	28	64	38	133	50	229	62	351
	15	34	58	46	124	59	217	73	337
	20	48	52	55	116	69	206	84	322
30	0	0	100	0	213	0	374	0	587
	2	9	81	13	166	14	283	18	432
	5	21	77	28	160	36	275	45	421
	10	27	70	37	150	48	262	59	405
	15	33	64	44	141	57	249	70	389
	20	56	58	53	132	66	237	80	374
	30	NR	NR	73	113	88	214	104	346

NOTE: Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90 ° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

Table 3.

Vent Connector Capacity
Type B Double Wall Vents with Type B Double Wall Connectors Serving Two or More Category I Appliances

Vent Height H (feet)	Connector Rise R (feet)	Vent and Connector Diameter - D (inches)							
		3 inch		4 inch		5 inch		6 inch	
		Appliance Input Rating in Thousands of Btu per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	1	22	37	35	66	46	106	58	164
	2	23	41	37	75	48	121	60	183
	3	24	44	38	81	49	132	62	199
8	1	22	40	35	72	49	114	64	176
	2	23	44	36	80	51	128	66	195
	3	24	47	37	67	53	139	67	210
10	1	22	43	34	78	49	123	65	189
	2	23	47	36	86	51	136	67	206
	3	24	50	37	92	52	146	69	220
15	1	21	50	33	89	47	142	64	220
	2	22	53	35	96	49	153	66	235
	3	24	55	36	102	51	163	68	248
20	1	21	54	33	99	46	157	62	246
	2	22	57	34	105	48	167	64	259
	3	23	60	35	110	50	176	66	271
30	1	20	62	31	113	45	181	60	288
	2	21	64	33	118	47	190	62	299
	3	22	66	34	123	48	198	64	309

Table 4.

Common Vent Capacity
Type B Double Wall Vents with Type B Double Wall Connectors Serving Two or More Category I Appliances

Vent Height H (feet)	Common Vent Diameter - D (inches)							
	4 inch		5 inch		6 inch		7 inch	
	Appliance Input Rating in Thousands of Btu per Hour							
	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT
6	92	81	140	116	204	161	309	248
8	101	90	155	129	224	178	339	275
10	110	97	169	141	243	194	367	299
15	125	112	195	164	283	228	427	352
20	136	123	215	183	314	255	475	394
30	152	138	244	210	361	297	547	459

Table 5.

Removal of the Furnace from Common Vent

In the event that an existing furnace is removed from a venting system commonly run with separate gas appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.

Conduct the following test while each appliance is operating and the other appliances (which are not operating) remain connected to the common venting system. If the venting system has been installed improperly, you must correct the system as indicated in the general venting requirements section.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.

The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:

1. Seal any unused openings in the common venting system.
2. Inspect the venting system for proper size and horizontal pitch. Determine that there is no blockage, restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
3. Close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Follow the lighting instructions. Turn on the appliance that is being inspected. Adjust the thermostat so that the appliance operates continuously.
5. After the burners have operated for 5 minutes, test for leaks of flue gases at the draft hood relief opening. Use the flame of a match or candle.
6. After determining that each appliance connected to the common venting system is venting properly, (step 3) return all doors, windows, exhaust fans, fireplace dampers, and any other gas burning appliances to their previous mode of operation.
7. If a venting problem is found during any of the preceding tests, the common venting system must be modified to correct the problem.

Resize the common venting system to the minimum vent pipe size determined by using the appropriate tables in Appendix G. (These are in the current standards of the National Fuel Gas Code ANSI 2223.1.

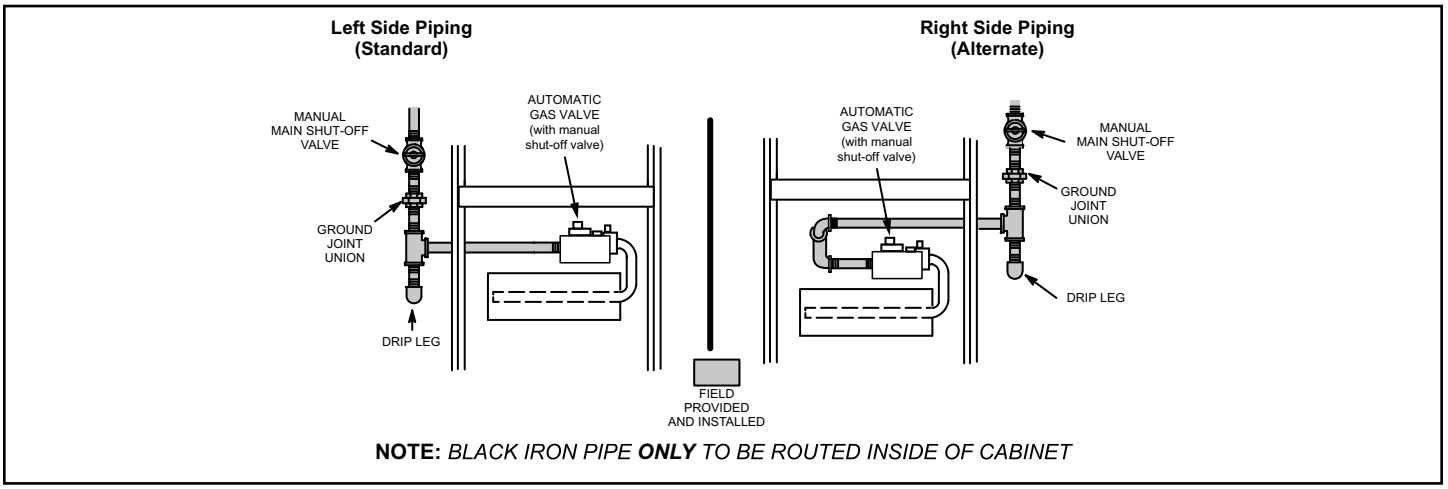
Gas Piping

⚠ CAUTION

If a flexible gas connector is required or allowed by the authority that has jurisdiction, black iron pipe shall be installed at the gas valve and extend outside the furnace cabinet. The flexible connector can then be added between the black iron pipe and the gas supply line.

Gas Supply

1. This unit is shipped standard for left or right side installation of gas piping (or top entry in horizontal applications). Connect the gas supply to the piping assembly.
2. When connecting the gas supply piping, consider factors such as length of run, number of fittings, and furnace rating to avoid excessive pressure drop. Table 6 lists recommended pipe sizes for typical applications.



NOTE: *BLACK IRON PIPE **ONLY** TO BE ROUTED INSIDE OF CABINET*

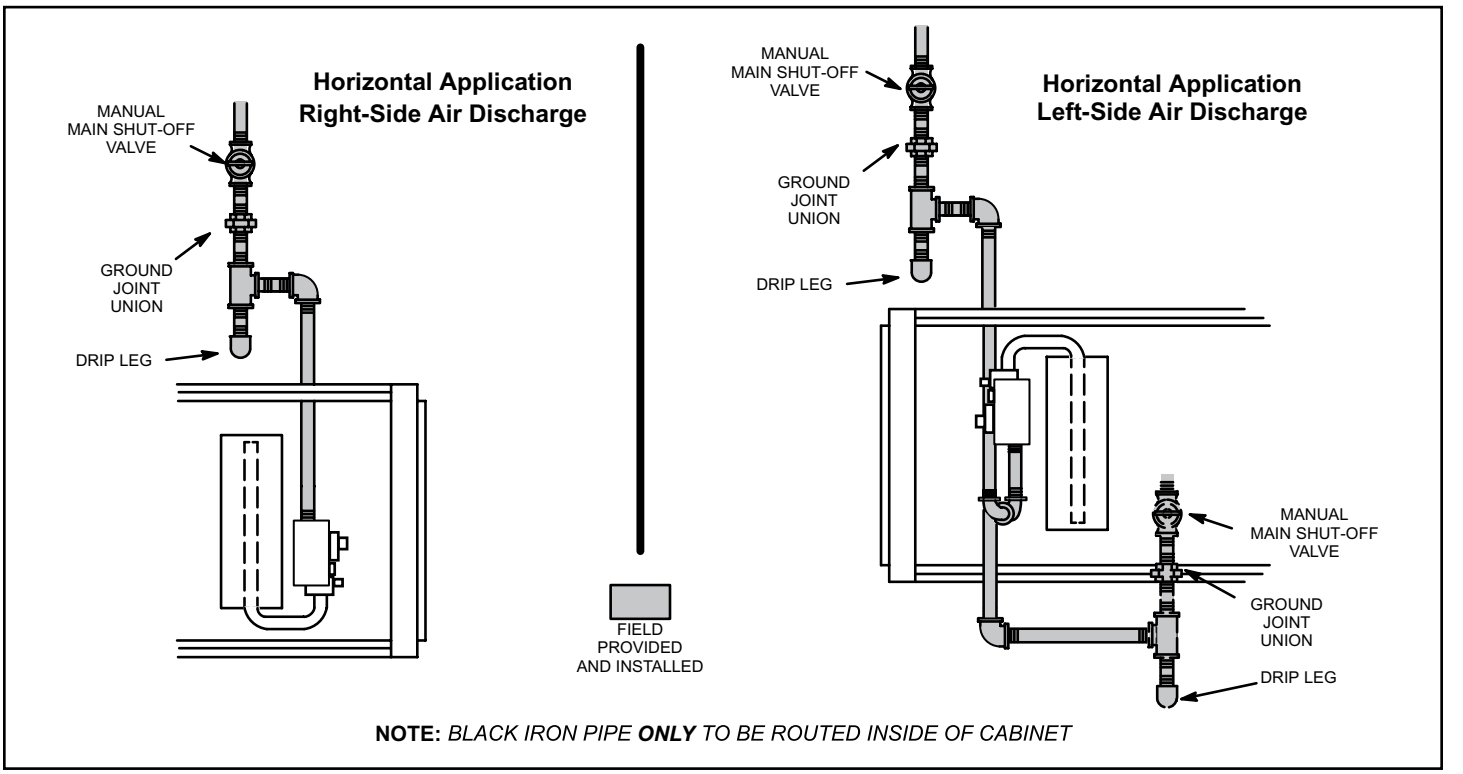
Figure 25. Possible Gas Piping Configurations - Upflow Applications

Gas Pipe Capacity - FT³/HR (kL/HR)

Nominal Iron Pipe Size - inches (mm)	Internal Diameter - inches (mm)	Length of Pipe - feet (m)									
		10 (3.048)	20 (6.096)	30 (9.144)	40 (12.192)	50 (15.240)	60 (18.288)	70 (21.336)	80 (24.384)	90 (27.432)	100 (30.480)
1/2 (12.7)	.622 (17.799)	175 (4.96)	120 (3.40)	97 (2.75)	82 (2.32)	73 (2.07)	66 (1.87)	61 (1.73)	57 (1.61)	53 (1.50)	50 (1.42)
3/4 (19.05)	.824 (20.930)	360 (10.19)	250 (7.08)	200 (5.66)	170 (4.81)	151 (4.28)	138 (3.91)	125 (3.54)	118 (3.34)	110 (3.11)	103 (2.92)
1 (25.4)	1.049 (26.645)	680 (19.25)	465 (13.17)	375 (10.62)	320 (9.06)	285 (8.07)	260 (7.36)	240 (6.80)	220 (6.23)	205 (5.80)	195 (5.52)
1-1/4 (31.75)	1.380 (35.052)	1400 (39.64)	950 (26.90)	770 (21.80)	660 (18.69)	580 (16.42)	530 (15.01)	490 (13.87)	460 (13.03)	430 (12.18)	400 (11.33)
1-1/2 (38.1)	1.610 (40.894)	2100 (59.46)	460 (41.34)	1180 (33.41)	990 (28.03)	900 (25.48)	810 (22.94)	750 (21.24)	690 (19.54)	650 (18.41)	620 (17.56)
2 (50.8)	2.067 (52.502)	3950 (111.85)	2750 (77.87)	2200 (62.30)	1900 (53.80)	1680 (47.57)	1520 (43.04)	1400 (39.64)	1300 (36.81)	1220 (34.55)	1150 (32.56)
2-1/2 (63.5)	2.469 (67.713)	6300 (178.39)	4350 (123.17)	3520 (99.67)	3000 (84.95)	2650 (75.04)	2400 (67.96)	2250 (63.71)	2050 (58.05)	1950 (55.22)	1850 (52.38)
3 (76.2)	3.068 (77.927)	11000 (311.48)	7700 (218.03)	6250 (176.98)	5300 (150.07)	4750 (134.50)	4300 (121.76)	3900 (110.43)	3700 (104.77)	3450 (97.69)	3250 (92.03)
4 (101.6)	4.026 (102.260)	23000 (651.27)	15800 (447.39)	12800 (362.44)	10900 (308.64)	9700 (274.67)	9700 (274.67)	8100 (229.36)	7500 (212.37)	7200 (203.88)	6700 (189.72)

NOTE: *Capacity given in cubic feet of gas per hour (kilo liters of gas per hour) and based on 0.60 specific gravity gas.*

Table 6.



NOTE: *BLACK IRON PIPE **ONLY** TO BE ROUTED INSIDE OF CABINET*

Figure 26. Possible Gas Piping Configurations - Horizontal Applications

3. The gas piping must not run in or through air ducts, clothes chutes, gas vents or chimneys, dumb waiters, or elevator shafts.
4. The piping should be sloped 1/4 inch (6.4 mm) per 15 feet (4.57 m) upward toward the meter from the furnace. The piping must be supported at proper intervals [every 8 to 10 feet (2.44 to 3.01 m)] with suitable hangers or straps. Install a drip leg in vertical pipe runs to the unit.
5. A 1/8" N.P.T. plugged tap or pressure post is located on the gas valve to facilitate test gauge connection. See Figure 27.
6. In some localities, codes may require the installation of a manual main shut off valve and union (furnished by the installer) external to the unit. The union must be of the ground joint type.

⚠ IMPORTANT

Compounds used on threaded joints of gas piping must be resistant to the actions of liquified petroleum gases.

NOTE: *If emergency shutoff is necessary, shut off the main manual gas valve and disconnect main power to the furnace. The installer should properly label these devices.*

Leak Check

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

NOTE: *If emergency shutoff is necessary, shut off the main manual gas valve and disconnect the main power to the furnace. The installer should properly label these devices.*

⚠ CAUTION

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.

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

⚠ IMPORTANT

When testing pressure of gas lines, gas valve must be disconnected and isolated. See Figure 27. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa, 14 inches w.c.).

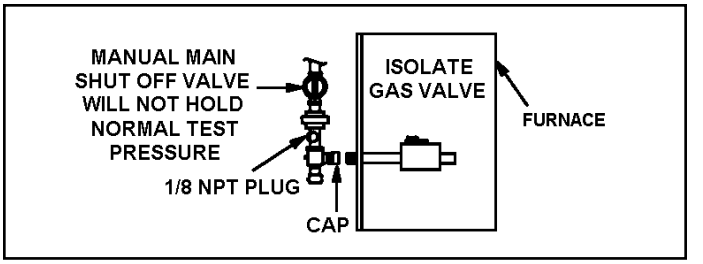


Figure 27.

Electrical

ELECTROSTATIC DISCHARGE (ESD)

Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and service to protect the furnace's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the furnace, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

The unit is equipped with a field make-up box on the left hand side of the cabinet. The make-up box may be moved to the right side of the furnace to facilitate installation. If the make-up box is moved to the right side, clip the wire ties that bundle the wires together. The excess wire must be pulled into the blower compartment. Secure the excess wire to the existing harness to protect it from damage.

Refer to Figure 31 for schematic wiring diagram and troubleshooting.

The power supply wiring must meet Class I restrictions. Protected by either a fuse or circuit breaker, select circuit protection and wire size according to unit nameplate.

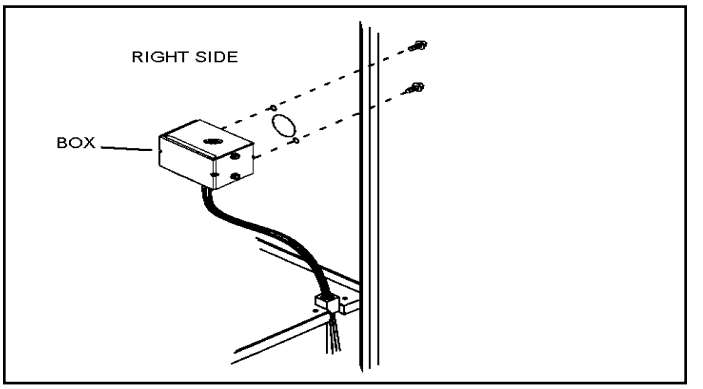


Figure 28. Interior Make-Up Box Installation

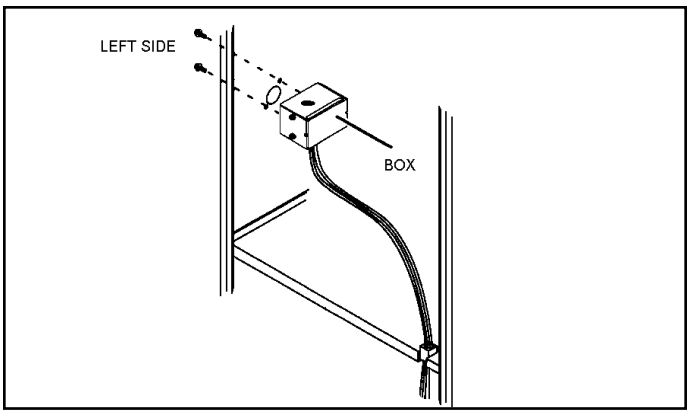


Figure 29. Interior Make-Up Box Installation

NOTE: *Unit nameplate states maximum current draw. Maximum over current protection allowed is 15 AMP.*

Holes are on both sides of the furnace cabinet to facilitate wiring.

Install a separate (properly sized) disconnect switch near the furnace so that power can be turned off for servicing.

Before connecting the thermostat, check to make sure the wires will be long enough for servicing at a later date. Make sure that thermostat wire is long enough to facilitate future removal of blower for service.

Complete the wiring connections to the equipment. Use the provided unit wiring diagram shown in Figure 31. Use 18 gauge wire or larger that is suitable for Class II rating for thermostat connections.

Electrically ground the unit according to local codes or, in the absence of local codes, according to the current National Electric Code (ANSI/NFPA No. 70). A green ground wire is provided in the field make-up box.

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

Accessory Terminals

One line voltage “ACC” 1/4” spade terminal is provided on the furnace integrated control. See Figure 32 for integrated control configuration. This terminal is energized when the indoor blower is operating. Any accessory rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. If an accessory rated at greater than one amp is connected to this terminal, it is necessary to use an external relay.

One line voltage “HUM” 1/4” spade terminal is provided on the furnace integrated control. See Figure 32 for integrated control configuration. This terminal is energized in the heating mode when the combustion air inducer is operating. Any humidifier rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. If a humidifier rated at greater than one amp is connected to this terminal, it is necessary to use an external relay.

One 24V “H” 1/4” spade terminal is provided on the furnace control board. Any humidifier rated up to 0.5 amp can be connected to this terminal with the ground leg of the circuit connected to ground or the “C” terminal. See Figure 32 for control board configuration. This terminal is energized in the heating mode when the combustion air inducer is operating.

Generator Use - Voltage Requirements

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

- The furnace requires 120 volts ± 10% (Range: 108 volts to 132 volts).
- The furnace operates at 60 Hz ± 5% (Range: 57 Hz to 63 Hz).
- The furnace integrated control requires both polarity and proper ground. Both polarity and proper grounding should be checked before attempting to operate the furnace on either permanent or temporary power.
- Generator should have a wave form distortion of less than 5% RHO.

Thermostat

Install the room thermostat according to the instructions provided with the thermostat. See Figure 30 for thermostat designations. If the furnace is being matched with a heat pump, refer to the FM21 installation instruction or appropriate dual fuel thermostat instructions.

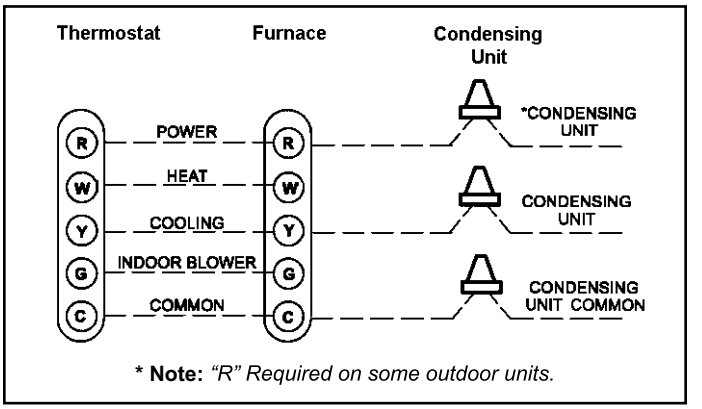


Figure 30. Condensing Unit Thermostat Designations (Refer to Specific Thermostat and Outdoor Unit)

Indoor Blower Speeds

1. When the thermostat is set to “FAN ON,” the indoor blower will run continuously on the fan speed when there is no cooling or heating demand. See Table 14 for allowable continuous circulation speeds.
2. When the unit is running in the heating mode, the indoor blower will run on the heating speed.
3. When there is a cooling demand, the indoor blower will run on the cooling speed.

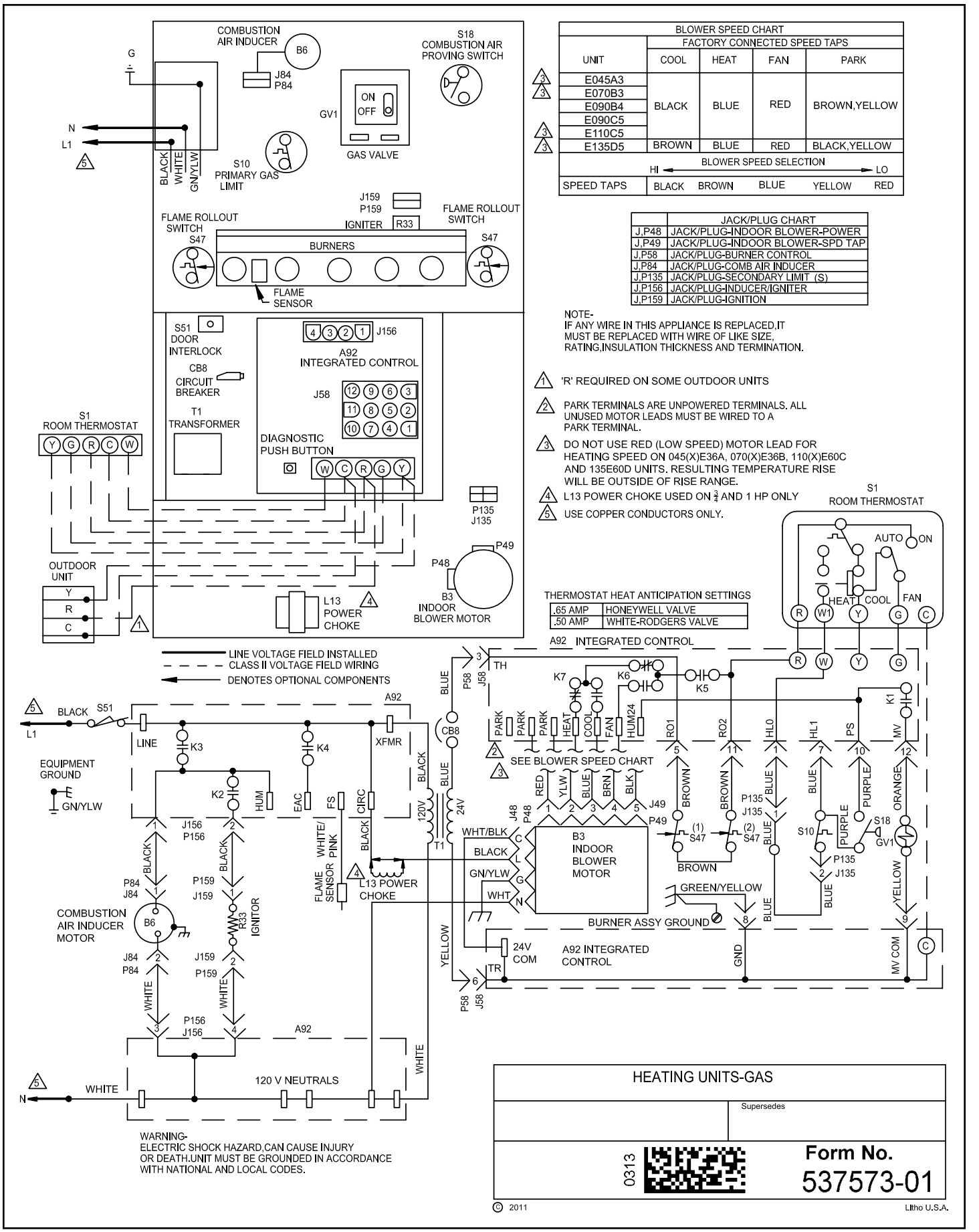


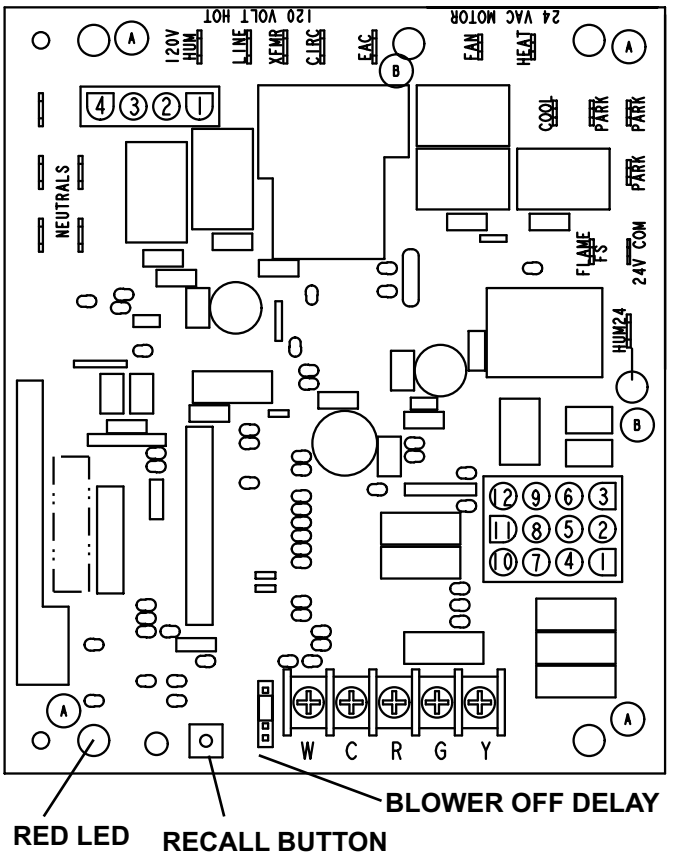
Figure 31. Wiring Diagram

-02 Integrated Control LED Codes	
Red LED Flash Code	**Diagnostic Codes / Status of Furnace**
LED Off	No power to control or control hardware fault detected
Heartbeat[1]	Control powered - displayed during all modes of operation if no errors are detected
1 Flash	Reverse line voltage polarity
2 Flashes	Improper earth ground
3 Flashes	Burner failed to light, or lost flame during heat demand
4 Flashes	Low flame signal - check flame sensor
5 Flashes	Watchguard - burner failed to light, exceeded maximum number of retries or recycles
6 Flashes	Not used
7 Flashes	Primary or Secondary limit open or watchguard mode - limit switch open longer than 3 minutes
8 Flashes	Rollout switch open
9 Flashes	Pressure switch failed to close or opened during heat demand
10 Flashes	Watchguard - Pressure switch opened 5 times during one heat demand
11 Flashes	Pressure switch stuck closed prior to activation of combustion air inducer
12 Flashes	Flame sensed without gas valve energized
13 Flashes	Low line voltage
[1] A “heartbeat” is indicated by a “slow flash” - 1 sec on 1 sec off, repeating **NOTE**: Last 10 error codes are stored in memory, including when power is shut off to the unit. To recall, press and release button. Most recent will be displayed first, LED off for 3 sec, then next error code is displayed, etc. To clear error codes, depress and hold button longer than 5 seconds.	

Table 7. Diagnostic Codes for -02 Control

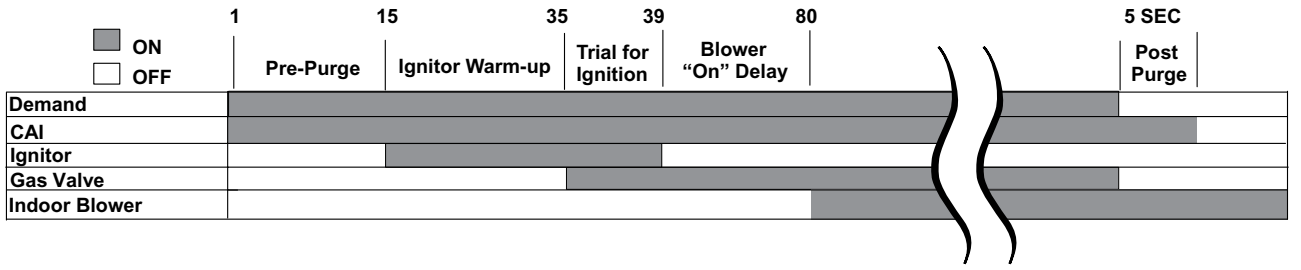
-03 Integrated Control LED Codes	
Red LED Flash Code[2]	**Diagnostic Codes / Status of Furnace**
LED Off	No power to control or control hardware fault detected
Heartbeat[1]	Normal operation - idle, continuous fan, cool
Continuous Rapid Flash	Call for heat / burner operation
1 Flash	Reverse line voltage polarity
2 Flashes	Improper earth ground
3 Flashes	Burner failed to light, or lost flame during heat demand
4 Flashes	Low flame signal - check flame sensor
5 Flashes	Watchguard - burner failed to light, exceeded maximum number of retries or recycles
6 Flashes	Not used
7 Flashes	Primary or Secondary limit open or watchguard mode - limit switch open longer than 3 minutes
8 Flashes	Rollout switch open
9 Flashes	Pressure switch failed to close or opened during heat demand
10 Flashes	Watchguard - Pressure switch opened 5 times during one heat demand
11 Flashes	Pressure switch stuck closed prior to activation of combustion air inducer
12 Flashes	Flame sensed without gas valve energized
13 Flashes	Low line voltage
[1] A “heartbeat” is indicated by a “slow flash” - 1 sec on 1 sec off, repeating [2] Error codes are indicated by a “rapid flash” - the LED flashes X times at 1/2 sec on, 1/2 sec off, remains off for 3 sec, then repeats **NOTE**: Last 10 error codes are stored in memory, including when power is shut off to the unit. To recall, press and release button. Most recent will be displayed first, LED off for 3 sec, then next error code is displayed, etc. To clear error codes, depress and hold button longer than 5 seconds.	

Table 8. Diagnostic Codes for -03 Control



Terminal Designations	
120 HUM	Humidifier (120 VAC)
LINE	Input (120 VAC)
XFMR	Transformer (120 VAC)
CIRC	Indoor Blower (120 VAC)
EAC	Electronic Air Cleaner (120 VAC)
COOL	Blower - Cooling Speed (24 VAC)
HEAT	Blower - Heating Speed (24 VAC)
FAN	Blower - Fan Speed (24 VAC)
PARK	Dead terminals to park all speed taps
NEUTRALS	Neutral Terminals (120 VAC)
FS	Flame Sense
24 COM	Common (24 VAC)
HUM 24	Humidifier (24 VAC)

Figure 32. Integrated Control
(Automatic Hot Surface Ignition System)



Blower on time will be 45 seconds after gas valve is energized. Blower off time will depend on "OFF TIME" Setting.

Figure 33. Heating Sequence of Operation

Unit Start-Up

FOR YOUR SAFETY, READ BEFORE LIGHTING UNIT

⚠ WARNING

Do not use this furnace if any part have been underwater. Immediately call a licensed professional service technician (or equivalent) to inspect the furnace and to replace any part of the control system and any gas control which has been underwater.

⚠ WARNING

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

⚠ CAUTION

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

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

The gas valve on this unit will be equipped with a gas control switch. Use only your hand to move the switch. Never use tools. If the switch will not turn or if the control switch will not move by hand, do not try to repair it.

Placing the Furnace into Operation

These units are equipped with an automatic ignition system. Do not attempt to manually light burners on these furnaces. Each time the thermostat calls for heat, the burners will automatically light. The ignitor does not get hot when there is no call for heat on units with an automatic ignition system.

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

Gas Valve Operation

See Figure 34

1. **STOP!** Read the safety information at the beginning of this section.
2. Set the thermostat to the lowest setting.
3. Turn off all electrical power to the unit.
4. This furnace is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.
5. Remove the upper access panel.
6. Move switch on gas valve to OFF. Do not force. See Figure 34.
7. Wait five minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to next step.

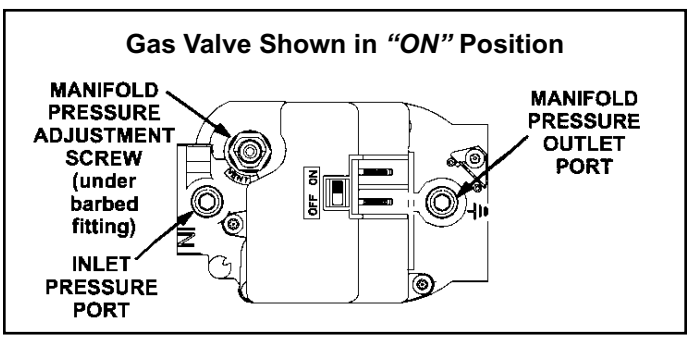


Figure 34.

8. Move switch on gas valve to ON. Do not force. See Figure 34.
9. Replace the upper access panel.
10. Turn on all electrical power to the unit.
11. Set the thermostat to desired setting.

    NOTE: *When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.*
12. If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call your service technician or gas supplier.

Turning Off Gas to Unit

1. Set the thermostat to the lowest setting.
2. Turn OFF all electrical power to the unit if service is to be performed.
3. Remove the upper access panel.
4. Move switch on gas valve to OFF. Do not force.
5. Replace the upper access panel.

Failure to Operate

If the unit fails to operate, check the following:

1. Is the thermostat calling for heat?
2. Are access panels securely in place?
3. Is the main disconnect switch closed?
4. Is there a blown fuse or tripped circuit breaker?
5. Is the filter dirty or plugged? Dirty or plugged filters will cause the limit control to shut the unit off.
6. Is gas turned on at the meter?
7. Is the manual main shut-off valve open?
8. Is the internal manual shut-off valve open?
9. Is the unit ignition system in lock out? If the unit locks out again, call the service technician to inspect the unit for blockages.
10. Is pressure switch closed? Obstructed flue will cause unit to shut off at pressure switch. Check flue and outlet for blockages.
11. Are flame rollout switches tripped? If flame rollout switches are tripped, call the service technician for inspection.

Heating Sequence of Operation

See Figure 33

1. When thermostat calls for heat, combustion air blower starts.
2. Combustion air pressure switch proves blower operation. Switch is factory set and requires no adjustment.
3. After a 15 second pre-purge, the hot surface ignitor energizes.
4. After a 20 second ignitor warm-up period, the gas valve solenoid opens. A 4 second trial for ignition period begins.

5. Gas is ignited, flame sensor proves the flame, and the combustion process continues.
6. If flame is not detected after first ignition trial, the ignition control will repeat steps 3 and 4 four more times before locking out the gas valve. The ignition control will then automatically repeat steps 1 through 6 after 60 minutes.
7. To interrupt the 60 minute, move thermostat from “Heat” to “OFF” then back to “Heat”. Heating sequence then restarts at step 1.

Gas Pressure Adjustment

Gas Flow (Approximate)

Gas Meter Clocking Chart				
Capacity	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
-045	80	160	200	400
-070	55	110	136	272
-090	41	82	102	204
-110	33	66	82	164
-135	27	54	68	136
	Natural - 1000 btu/cu ft		LP - 2500 btu/cu ft	

Table 9.

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) Divide by two and compare to time in Table 9. If manifold pressure matches Table 10 and rate is incorrect, check gas orifices for proper size and restriction. Remove temporary gas meter if installed.

NOTE: *To obtain accurate reading, shut off all other gas appliances connected to meter.*

Supply Pressure Measurement

A threaded plug on the inlet side of the gas valve provides access to the supply pressure tap. Remove the threaded plug, install a field provided barbed fitting and connect a manometer to measure supply pressure. See Table 10 for proper line pressure. Replace the threaded plug after measurements have been taken.

Manifold Pressure Measurement

1. Remove the threaded plug from the outlet side of the gas valve and install a field provided barbed fitting. Connect to a manometer to measure manifold pressure.
2. Start unit and allow 5 minutes for unit to reach steady state.
3. While waiting for the unit to stabilize, observe the flame. Flame should be stable and should not lift from burner. Natural gas should burn blue.
4. After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in Table 10.

NOTE: *Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to remove barbed fitting and replace threaded plug.*

Manifold Pressure

Between 2000 and 7500 ft, certain units require manifold pressure adjustments specified in Table 10. Manifold pressure should be measured, and adjusted as required during unit start up.

NOTE: *LP/Propane installations require a gas conversion Orifice Kit as specified in Table 12.*

Manifold Pressure and Line Pressure at Various Altitudes											
Capacity	Manifold Pressure (in. w.c.)[1]								Line Pressure (in. w.c.)		
	0 - 2000 ft.		2001 - 4500 ft.		4501 - 7500 ft.		7501 - 10000 ft.		Minimum		Max.
	Nat. Gas	LP Gas[2]	Nat. Gas	LP Gas[2]	Nat. Gas	LP Gas[2]	Nat. Gas[3]	LP Gas[2]	Nat. Gas	LP Gas[2]	Nat. & LP
045	3.5	10.0	3.2	10.0	3.0	10.0	3.5	10.0	4.5	11.0	13.0
070			3.2	10.0	2.8	10.0					
090			3.2	10.0	2.7	9.6					
110			3.5	10.0	3.0	9.6					
135			3.5	10.0	2.9	9.6					

[1] Manifold pressure adjustments based on 1020 Btu/ft3 gas for natural and 2500 Btu/ft[3] gas for LP (corrected to standard conditions). Consult local utility for actual local heating value.

[2] A natural to LP/Propane gas conversion Orifice Kit is required to convert this unit. Refer to kit instructions for conversion procedure.

[3] A high altitude natural Orifice Kit is required.

Table 10.

Proper Combustion

Furnace should operate a minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue out let and compare to the tables below. The maximum carbon monoxide reading should not exceed 100 ppm.

Capacity	CO_2% for Nat	CO_2% for LP
-045	7.2 - 7.8	7.5 - 9.0
-070		
-090		
-110		
-135		

Table 11.

High Altitude

This furnace is carefully designed for optimal performance under a wide range of operating conditions. To ensure proper operation at higher altitudes, certain adjustments and/or kits may be required.

Pressure Switch

Between 4501 and 7500 ft, some units may require a pressure switch change. Table 12 lists the available Pressure Switch Kits providing the minimum allowable pressure switch set points, in this altitude range, for each unit. The need for a Pressure Switch Kit may be evaluated by comparing the pressure measured at the pressure switch under steady state conditions (after 15 minutes of run time) against the as shipped switch set point. Insufficient negative pressure may lead to nuisance pressure switch trips and possible unit lock outs.

Above 7500 feet, all units require both a burner orifice change and a pressure switch change per Table 12.

Fan Control

The fan on time of 45 seconds is not adjustable. The heat fan off delay (amount of time that the blower operates after the heat demand has been satisfied) may be adjusted by changing the jumper position across the five pins on the integrated control. The unit is shipped with a factory fan off delay setting of 90 seconds. The fan off delay affects comfort and is adjustable to satisfy individual applications. Adjust the fan off delay to achieve a supply air temperature between 90° and 110° F at the moment that the blower is de-energized. Longer off delay settings provide lower return air temperatures; shorter settings provide higher return air temperatures. See Figure 35.

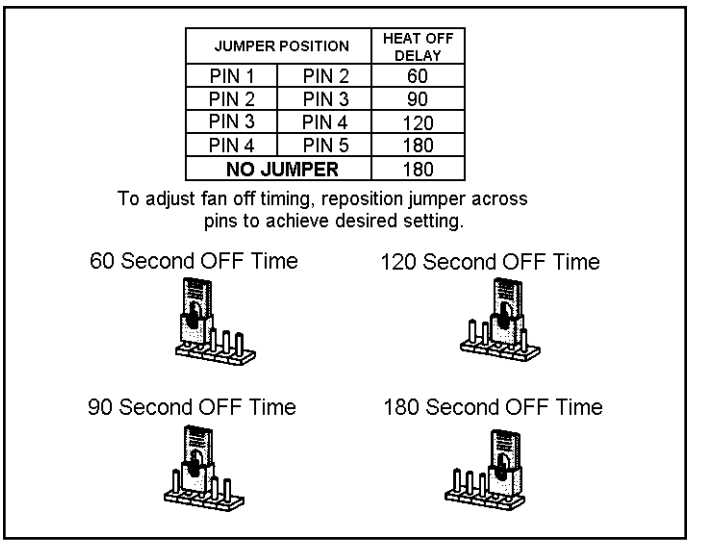


Figure 35. Heat Fan Off Time in Seconds

Orifice Kits and Pressure Switch Kits at Various Altitudes									
Capacity	0 - 4500 ft.			4501 - 7500 ft.			7501 - 10000 ft.		
	Pressure[1] Switch Kit	Natural to LP / Propane Orifice Kit	LP / Propane to Natural Orifice Kit	Pressure[1] Switch Kit	Natural to LP / Propane Orifice Kit	LP / Propane to Natural Orifice Kit	Pressure[1] Switch Kit	Natural Orifice Kit	LP / Propane Orifice Kit
045	As Shipped (-0.65" w.c.)	11K50[2] (0.034")	73W80[2] (0.063")	80W52 (-0.60" w.c.)	11K50[2] (0.034")	73W80[2] (0.063")	80W51 (-0.55" w.c.)	51W01 (0.055")	11K45[2] (0.032")
070	As Shipped (-0.68" w.c.)			80W52 (-0.60" w.c.)			80W51 (-0.55" w.c.)		
090	As Shipped (-0.65" w.c.)			80W52 (-0.60" w.c.)			80W51 (-0.55" w.c.)		
110	As Shipped (-0.68" w.c.)			80W57 (-0.65" w.c.)			80W52 (-0.60" w.c.)		
135	As Shipped (-0.65" w.c.)			80W52 (-0.60" w.c.)			80W51 (-0.55" w.c.)		

[1] Minimum allowable set points for this altitude range. Application of a Pressure Switch with lower set point (less negative / closer to zero) is not permitted.

[2] Kit contains burner orifices and gas valve regulator spring(s).

Table 12.

Constant Torque Motor

These units are equipped with a constant torque ECM motor. It has a DC motor coupled to an electronic control module,both contained in the same motor housing. The motor is programmed to provide constant torque at each of the five selectable speeds. The motor has five speed taps. Each tap requires 24 volts to energize.

Thermostat Heat Anticipation

Set the heat anticipator setting (if adjustable) according to the amp draw listed on the wiring diagram that is attached to the unit.

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

Electrical

1. Check all wiring for loose connections.
2. Check for the correct voltage at the furnace (furnace operating). Correct voltage is 120VAC ± 10%.
3. Check amp-draw on the blower motor with inner blower panel in place.

   Unit Nameplate_____ Actual_____

Blower Speeds

Follow the steps below to change the blower speeds.

1. Turn off electrical power to furnace.
2. Remove blower access panel.
3. Disconnect existing speed tap at integrated control speed terminal.

   NOTE: *Termination of any unused motor leads must be insulated.*
4. Place unused blower speed tap on integrated control “PARK” terminal or insulate.
5. Refer to blower speed selection chart on unit wiring diagram for desired heating or cooling speed. See Blower performance data. See Table 13 for allowable heating speeds.
6. Connect selected speed tap at integrated control speed terminal.
7. Resecure blower access panel.
8. Turn on electrical power to furnace.
9. Recheck temperature rise.

Other Unit Adjustments

Primary and Secondary Limits

The primary limit is located on the heating compartment vestibule panel. The secondary limits (if equipped) are located in the blower compartment, attached to the back side of the blower. These auto reset limits are factory set and require no adjustment.

Flame Rollout Switches

This manually reset switches are located on the Front of the burner box.

Pressure Switch

The pressure switch is located in the heating compartment adjacent to the combustion air inducer. The switch checks for proper combustion air inducer operation before allowing ignition trial. The switch is factory set and requires no adjustment.

Temperature Rise

After the furnace has been started, and supply and return air temperatures have been allowed to stabilize, check the temperature rise. If necessary, adjust the blower speed to maintain the temperature rise within the range shown on the unit nameplate. See Table 13 for allowable heating speeds. Increase the blower speed to decrease the temperature. Decrease the blower speed to increase the temperature rise. Failure to adjust the temperature rise may cause erratic limit operation.

Blower Performance

MGM80SE045A3A Performance (Less Filter)

External Static Pressure in. w.c.	Air Volume / Watts at Various Blower Speeds									
	High		Medium - High		Medium		Medium - Low		Low	
	cfm	watts	cfm	watts	cfm	watts	cfm	watts	cfm	watts
0.00	1380	265	1155	165	995	120	975	115	945	105
0.10	1345	270	1120	175	950	120	880	105	865	100
0.20	1320	285	1080	190	900	125	805	105	700	85
0.30	1290	295	1055	200	875	135	750	110	640	90
0.40	1265	310	1010	205	825	145	710	120	595	95
0.50	1230	315	990	215	790	155	660	125	535	100
0.60	1190	330	990	230	750	165	630	135	500	100
0.70	1165	340	915	235	705	170	570	140	435	115
0.80	1130	350	880	245	670	180	535	150	380	120

MGM80SE070B3A Performance (Less Filter)

External Static Pressure in. w.c.	Air Volume / Watts at Various Blower Speeds									
	High		Medium - High		Medium		Medium - Low		Low	
	cfm	watts	cfm	watts	cfm	watts	cfm	watts	cfm	watts
0.00	1415	265	1330	170	1215	135	1175	125	1075	85
0.10	1415	280	1295	170	1145	145	1130	130	955	95
0.20	1355	290	1225	185	1110	150	1080	140	885	100
0.30	1330	300	1190	200	1060	160	1035	155	825	110
0.40	1290	310	1155	205	1015	175	970	160	770	120
0.50	1245	325	1115	215	980	180	930	170	695	125
0.60	1225	335	1045	230	920	190	865	180	625	135
0.70	1190	350	1000	235	855	205	790	190	540	140
0.80	1160	365	925	245	790	205	735	200	445	145

MGM80SE090B4A Performance (Less Filter)

External Static Pressure in. w.c.	Air Volume / Watts at Various Blower Speeds									
	High		Medium - High		Medium		Medium - Low		Low	
	cfm	watts	cfm	watts	cfm	watts	cfm	watts	cfm	watts
0.00	1785	380	1570	270	1440	220	1395	190	1190	125
0.10	1755	395	1535	275	1420	230	1350	205	1140	135
0.20	1730	415	1505	290	1380	245	1310	215	1110	145
0.30	1690	435	1460	305	1345	260	1275	230	1065	160
0.40	1645	440	1435	320	1310	270	1240	240	1010	165
0.50	1615	455	1395	335	1265	285	1180	255	955	175
0.60	1590	470	1350	350	1210	290	1150	265	915	190
0.70	1545	475	1300	360	1175	305	1095	275	860	200
0.80	N/A	N/A	1270	370	1140	310	1040	285	820	210

MGM80SE090C5A Performance (Less Filter)

External Static Pressure in. w.c.	Air Volume / Watts at Various Blower Speeds																			
	Bottom Return Air, Side Return Air with Optional Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.										**Single Side Return Air -** Air volumes in **bold** require field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.									
	High		**Medium - High**		**Medium**		**Medium - Low**		**Low**		**High**		**Medium - High**		**Medium**		**Medium - Low**		**Low**	
	cfm	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**
0.00	2255	640	1940	420	1750	310	1580	230	1485	185	**2290**	**655**	**1980**	**425**	1775	310	1605	235	1495	195
0.10	2200	655	1910	440	1705	315	1535	240	1385	190	**2250**	**675**	**1945**	**445**	1730	320	1555	245	1400	190
0.20	2150	675	1865	450	1655	640	1490	260	1340	205	**2210**	**695**	**1885**	**465**	1680	340	1510	265	1350	205
0.30	2125	695	1835	475	1635	355	1450	275	1285	215	**2165**	**715**	**1850**	**475**	1645	355	1470	275	1285	215
0.40	2090	715	1800	495	1585	370	1405	285	1235	230	**2135**	**720**	**1810**	**490**	1595	370	1410	290	1225	230
0.50	2060	735	1760	510	1545	385	1370	305	1200	245	**2070**	**735**	1765	515	1545	390	1370	305	1180	245
0.60	2020	750	1725	525	1515	405	1320	320	1145	255	**2030**	**760**	1715	530	1495	405	1325	320	1140	255
0.70	1980	765	1680	540	1465	420	1265	330	1105	270	**1990**	**775**	1685	540	1450	425	1265	330	1095	270
0.80	1935	785	1635	560	1420	435	1225	350	1055	285	**1950**	**795**	1645	560	1415	435	1225	345	1040	285

MGM80SE110C5A Performance (Less Filter)

External Static Pressure in. w.c.	Air Volume / Watts at Various Blower Speeds																			
	Bottom Return Air, Side Return Air with Optional Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.										**Single Side Return Air -** Air volumes in **bold** require field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.									
	High		**Medium - High**		**Medium**		**Medium - Low**		**Low**		**High**		**Medium - High**		**Medium**		**Medium - Low**		**Low**	
	cfm	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**
0.00	2230	635	1945	430	1715	295	1555	230	1470	185	**2315**	**645**	**1990**	**415**	1780	300	1610	230	1510	200
0.10	2180	655	1905	445	1690	305	1510	240	1340	175	**2260**	**655**	**1945**	**425**	1740	315	1550	240	1400	185
0.20	2135	680	1865	465	1630	330	1470	260	1280	190	**2210**	**680**	**1895**	**460**	1680	335	1510	255	1350	200
0.30	2090	695	1830	480	1595	345	1440	275	1235	200	**2165**	**700**	**1850**	**465**	1650	355	1455	275	1285	210
0.40	2050	715	1785	495	1550	360	1385	285	1175	210	**2135**	**715**	**1830**	**485**	1585	365	1395	285	1230	225
0.50	2025	730	1740	520	1500	375	1340	300	1130	225	**2095**	**730**	1770	500	1535	385	1365	300	1175	235
0.60	2010	750	1710	535	1470	390	1305	320	1080	240	**2055**	**755**	1725	515	1495	400	1305	315	1135	250
0.70	1965	755	1670	555	1420	410	1255	330	1015	255	**2000**	**765**	1675	535	1465	410	1255	325	1080	265
0.80	1905	785	1635	560	1380	425	1215	350	975	270	**1965**	**785**	1640	555	1400	425	1210	345	1025	275

MGM80SE135D5A Performance (Less Filter)

External Static Pressure in. w.c.	Air Volume / Watts at Various Blower Speeds																			
	Bottom Return Air, Side Return Air with Optional Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.										**Single Side Return Air -** Air volumes in **bold** require field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.									
	High		**Medium - High**		**Medium**		**Medium - Low**		**Low**		**High**		**Medium - High**		**Medium**		**Medium - Low**		**Low**	
	cfm	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**	**cfm**	**watts**
0.00	2495	755	2295	590	2045	435	1845	315	1650	230	**2365**	**725**	**2295**	**575**	**2005**	**410**	**1820**	**300**	1635	235
0.10	2440	780	2220	620	2015	445	1820	330	1615	245	**2350**	**745**	**2210**	**595**	**2000**	**435**	1745	320	1530	230
0.20	2390	790	2175	640	1935	470	1735	350	1550	255	**2330**	**775**	**2175**	**625**	**1945**	**455**	1730	330	1490	250
0.30	2360	805	2140	655	1895	490	1720	370	1485	275	**2245**	**785**	**2135**	**645**	**1895**	**475**	1655	355	1425	265
0.40	2285	835	2125	675	1850	510	1660	380	1455	290	**2215**	**810**	**2085**	**660**	**1840**	**495**	1600	375	1385	285
0.50	2240	860	2060	690	1815	535	1610	400	1415	310	**2175**	**825**	**2045**	**680**	**1815**	**505**	1590	390	1340	290
0.60	2225	865	2015	715	1785	550	1535	420	1330	320	**2125**	**845**	**1995**	**700**	1765	530	1525	405	1300	310
0.70	2160	895	1955	735	1755	570	1500	440	1265	340	**2095**	**865**	**1950**	**710**	1700	545	1485	420	1260	325
0.80	2105	905	1925	750	1715	580	1435	450	1215	345	**2065**	**880**	**1880**	**725**	1680	655	1415	445	1205	345

Allowable Heating Speeds					
Models	**Red**	**Yellow**	**Blue**	**Brown**	**Black**
045-3	Not Allowed	Allowed	Factory Setting	Allowed	Not Allowed
070-3	Not Allowed	Allowed	Factory Setting	Allowed	Not Allowed
090-4	Allowed	Allowed	Factory Setting	Allowed	Not Allowed
090-5	Allowed	Allowed	Factory Setting	Allowed	Not Allowed
110-5	Not Allowed	Allowed	Factory Setting	Allowed	Not Allowed
135-5	Not Allowed	Allowed	Factory Setting	Not Allowed	Not Allowed

Table 13.

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

Table 14.

Service

⚠ WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD.

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

Improper servicing could result in dangerous operation, serious injury, death, or property damage. Before servicing, disconnect all electrical power to furnace.

When servicing controls, label all wires prior to disconnecting. Take care to reconnect wires correctly. Verify proper operation after servicing.

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

Blower

Check the blower wheel for debris and clean if necessary. The blower motors are pre-lubricated for extended bearing life. No further lubrication is needed.

⚠ WARNING

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

Filters

Filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filters when necessary to ensure that the furnace operates properly. Replacement filters must be rated for high velocity airflow. Table 1 lists recommended filter sizes.

Flue and Chimney

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

Electrical

1. Check all wiring for loose connections.
2. Check for the correct voltage at the furnace (furnace operating). Correct voltage is 120VAC ± 10%.
3. Check amp draw on the blower motor with inner blower panel in place.

   Unit Nameplate_____ Actual_____

Cleaning the Burners

NOTE: *Use papers or protective covering in front of the furnace during cleaning.*

4. Turn off both electrical and gas power supplies to furnace.
5. Label the wires from gas valve, rollout switches, primary limit switch and make-up box then disconnect them.
6. Disconnect gas supply piping. Remove the screw securing the burner box cover and remove cover. Remove the four screws securing the burner manifold assembly to the vestibule panel and remove the assembly from the unit.
7. To clean burners, run a vacuum cleaner with a soft brush attachment over the face of burners. Visually inspect inside the burners and crossovers for any blockage caused by foreign matter. Remove any blockage. Figure 36 shows burner detail.
8. Reinstall burner box, manifold assembly and burner box cover.
9. Re-install gas supply and turn on electrical power to furnace.

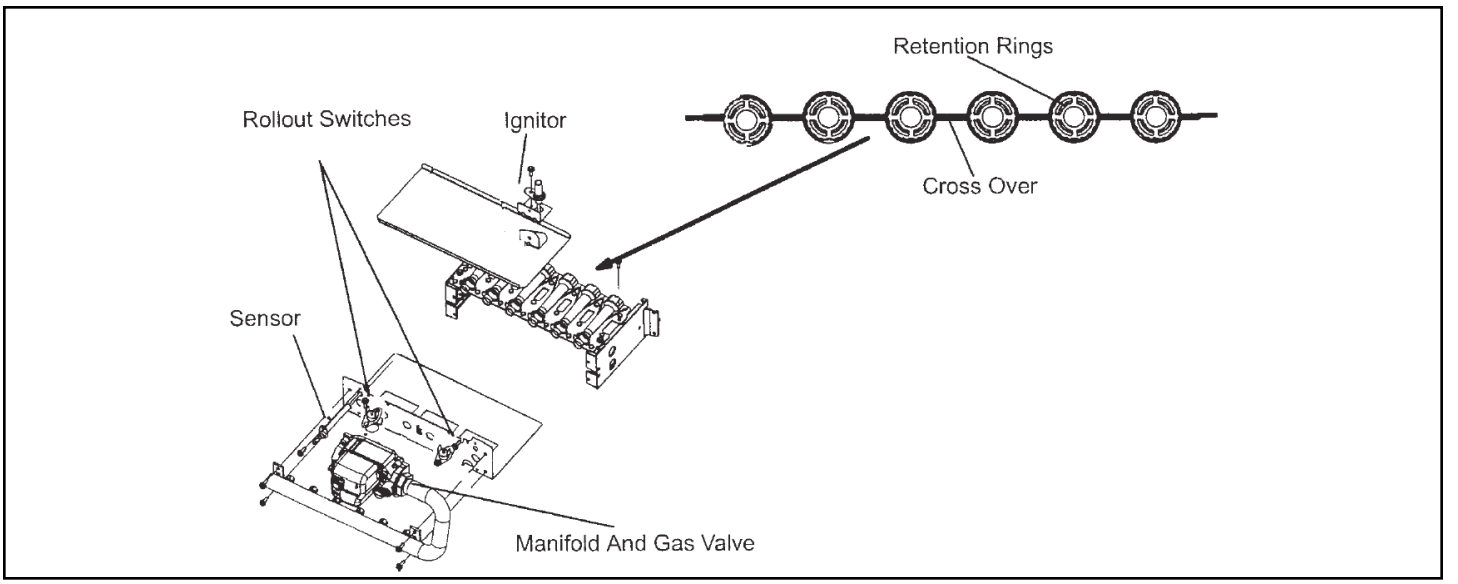


Figure 36. Burner Assembly Removal

Repair Parts List

The following repair parts are available through independent HVAC Distributing dealers. When ordering parts, include the complete furnace model number listed on the CSA International nameplate. All service must be performed by a licensed professional installer (or equivalent), service agency, or gas supplier.

Cabinet Parts

- Upper access panel
- Blower panel
- Top cap

Control Panel

- Parts Transformer
- Integrated control
- Door interlock switch
- Circuit breaker

Blower Parts

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

Heating Parts

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

Requirements for Commonwealth of Massachusetts

Modifications to NFPA-54, Chapter 10

Revise NFPA-54 section 10.8.3 to add the following requirements:
For all side wall, horizontally vented, gas-fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above the finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS**. At the time of installation of the side wall, horizontally vented, gas-fueled equipment, the installing plumber or gas fitter shall observe that a hard-wired carbon monoxide detector with an alarm and battery backup is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gas fitter shall observe that a battery-operated or hard-wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall, horizontally vented, gas-fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard-wired carbon monoxide detectors.
    a. In the event that the side wall, horizontally vented, gas-fueled equipment is installed in a crawl space or an attic, the hard-wired carbon monoxide detector with alarm and battery backup may be installed on the next adjacent floor level.
    b. In the event that the requirements of this subdivision cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery-operated carbon monoxide detector with an alarm shall be installed.
2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.
3. **SIGNAGE**. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented, gas-fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "**GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS.**"
4. **INSPECTION**. The state or local gas inspector of the side wall, horizontally vented, gas-fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

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

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

MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM PROVIDED.

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

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

MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED.

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

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

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

MRCOOL®

COMFORT MADE SIMPLE

Signature Series

MGM80*SE*XA Warm Air Gas Furnace

ELECTRICIAN and/or HVAC TECHNICIAN:

LICENSE #:

INSTALLATION DATE:

INSTALLATION LOCATION:

SERIAL NUMBER:

The design and specifications of this product and/or manual are subject to change without prior notice. Consult with the sales agency or manufacturer for details.