

INSTALLATION INSTRUCTIONS

A80UH2V & 80G1UH2V

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.

CAUTION

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

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.

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Manufactured By
Allied Air Enterprises, Inc.
A Lennox International, Inc. Company
215 Metropolitan Drive
West Columbia, SC 29170

A80UH2V & 80G1UH2V Unit Dimensions - inches (mm)

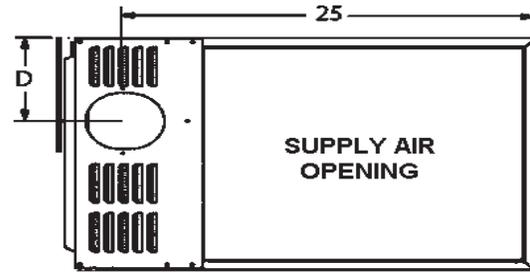
¹ **NOTE** - 20C and 20D size units installed in upflow applications that require air volumes of 1800 cfm (850 L/s or greater must have one of the following:

1. Return air from single side transition will accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter. (Required to maintain proper air velocity.)
2. Single side return air with optional RAB Return Air Base
3. Return Air from bottom and one side.
4. Return air from both sides.
5. Return air from bottom.

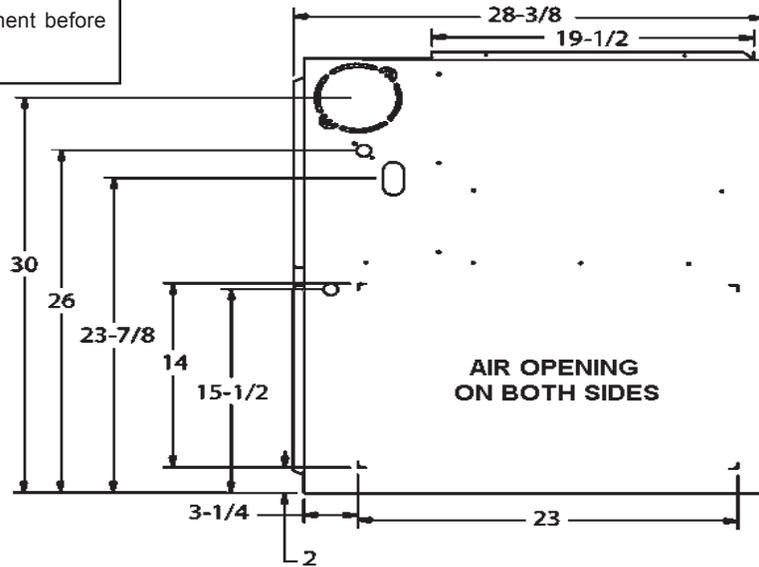
² Flue outlet may be horizontal but furnace must be vented vertically.

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

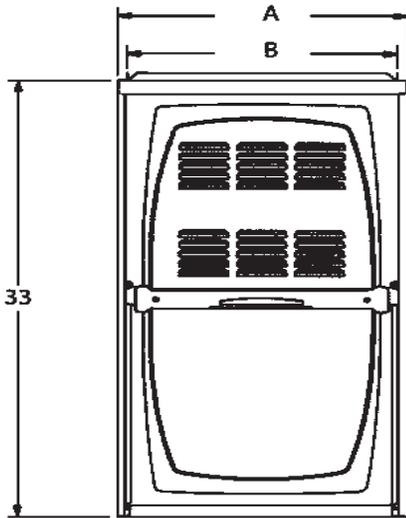
* Consider sizing requirements for optional IAQ equipment before cutting side return opening.



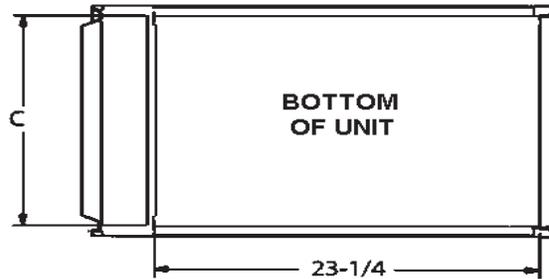
TOP VIEW



**AIR OPENING
ON BOTH SIDES**



FRONT VIEW



SIDE VIEW

Model A801UH2V/80G1UH2V	A		B		C		D	
	in.	mm	in.	mm	in.	mm	in.	mm
070-12	14-1/2	368	13-3/8	340	13	330	4-3/4	121
090-12 090-16 090-20	17-1/2	446	16-3/8	416	16	406	6-1/4	159
110-20	21	533	19-7/8	504	19-1/2	495	8	203
135-20	24-1/2	622	23-3/8	546	23	584	9-3/4	248

EXPLODED VIEW

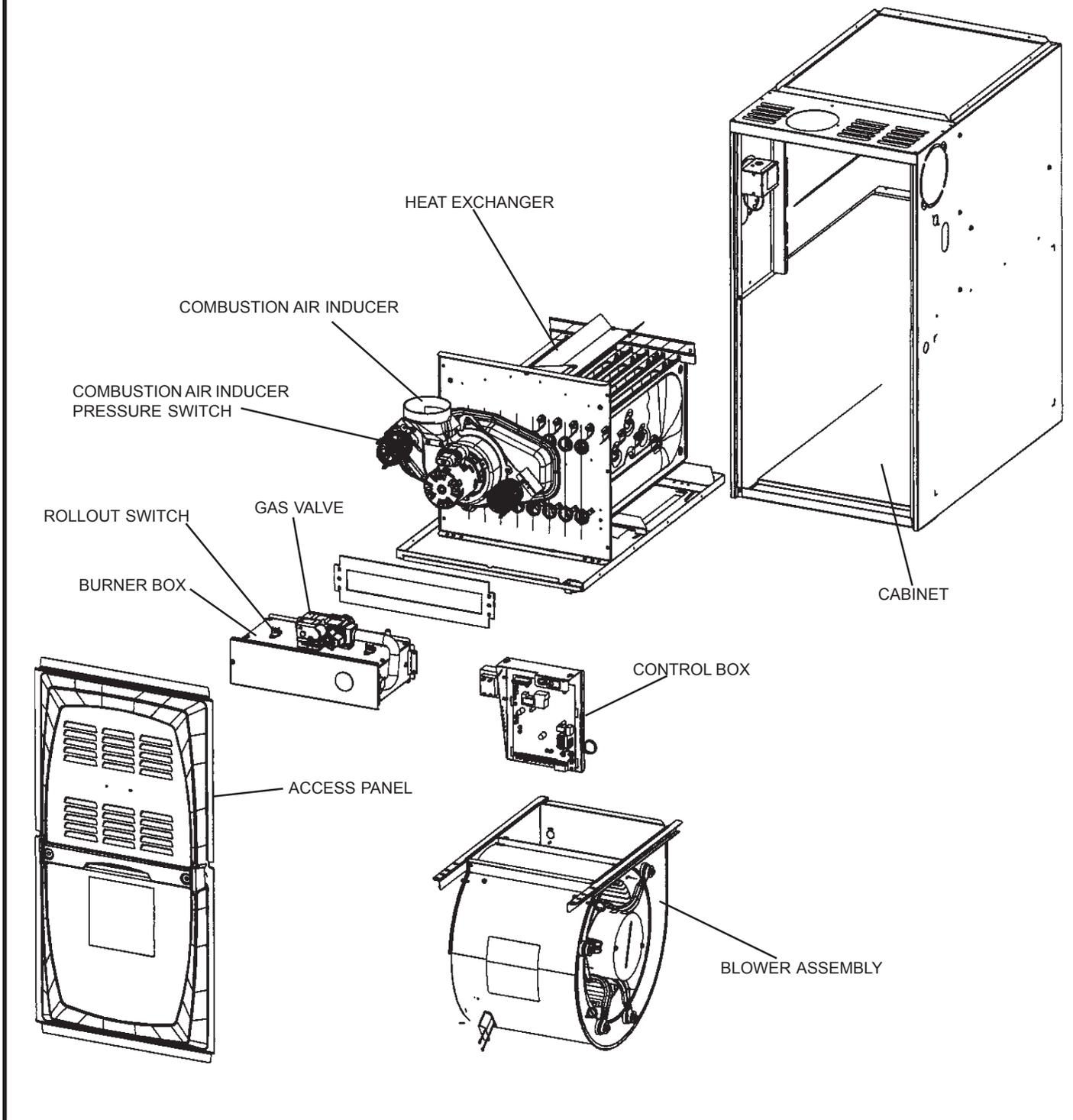


Figure 1

A80UH2V & 80G1UH2V Gas Furnace

The A80UH2V & 80G1UH2V gas furnace is shipped with ready for installation in the upflow or horizontal position (left or right). 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 a horizontal application. The panel may also be removed in upflow applications.

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 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.



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.



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

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 Figures 7 and 11. Accessibility and service clearances must take precedence over fire protection clearances.

NOTE: *For installation on combustible floors, the furnace shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring.*

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 2. 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 2.

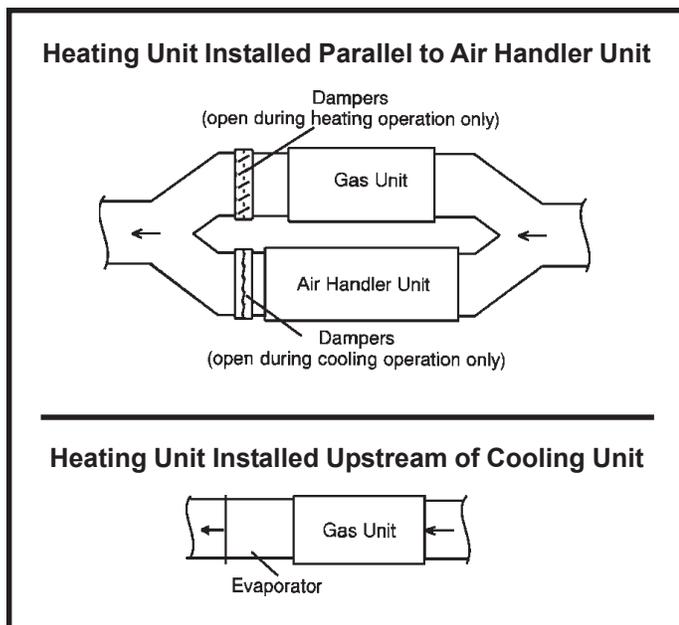


Figure 2

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

Use of Furnace as a Construction Heater

Allied Air does not recommend the use of these units as a construction heater during any phase of construction. Very low return air temperature, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

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

- The vent system must be permanently installed per these installation instructions.
- A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is not allowed.
- The return air duct must be provided and sealed to the furnace.
- Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.
- Air filters must be installed in the system and must be maintained during construction.
- Air filters must be replaced upon construction completion.
- The input rate and temperature rise must be set per the furnace rating plate.
- One hundred percent (100%) outdoor air must be provided for combustion air requirements during construction. Temporary ducting may supply outdoor air to the furnace. Do not connect duct directly to the furnace. Size the temporary duct following these instructions in section for Combustion, Dilution and Ventilation Air in a confined space with air from outside.
- The furnace heat exchanger, components, duct system, air filters and evaporator coils must be thoroughly cleaned following final construction clean-up.
- All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

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.

WARNING

Product Contains Fiberglass Wool.

Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

Allied Air Enterprises, Inc.
215 Metropolitan Drive
West Columbia, SC 29170

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.

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

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.

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.

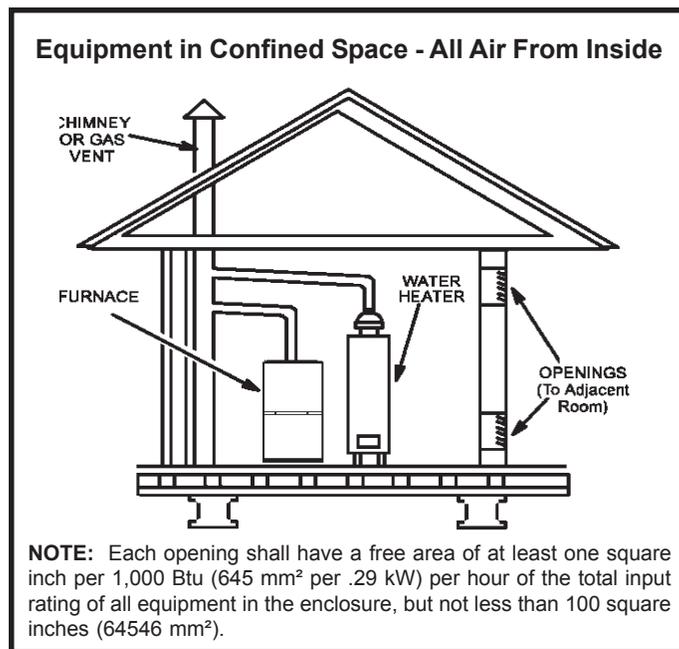


Figure 3

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 3.

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 Figures 4 and 5. 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 6.

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

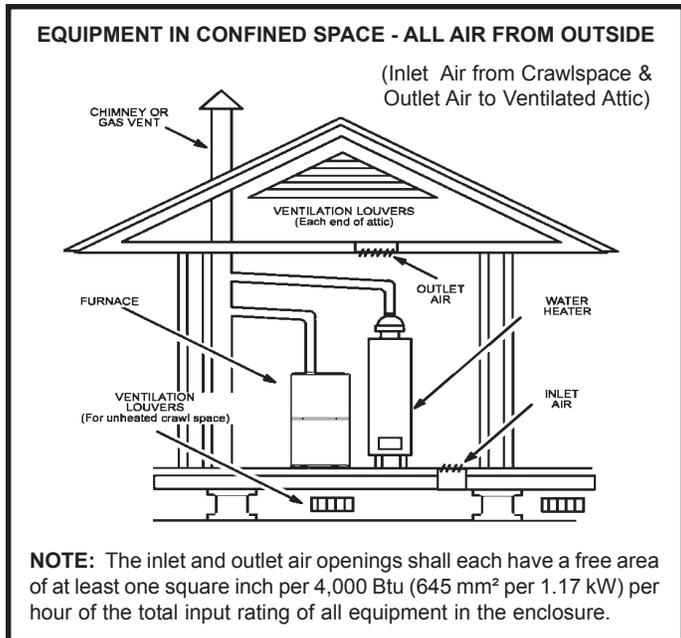


Figure 4

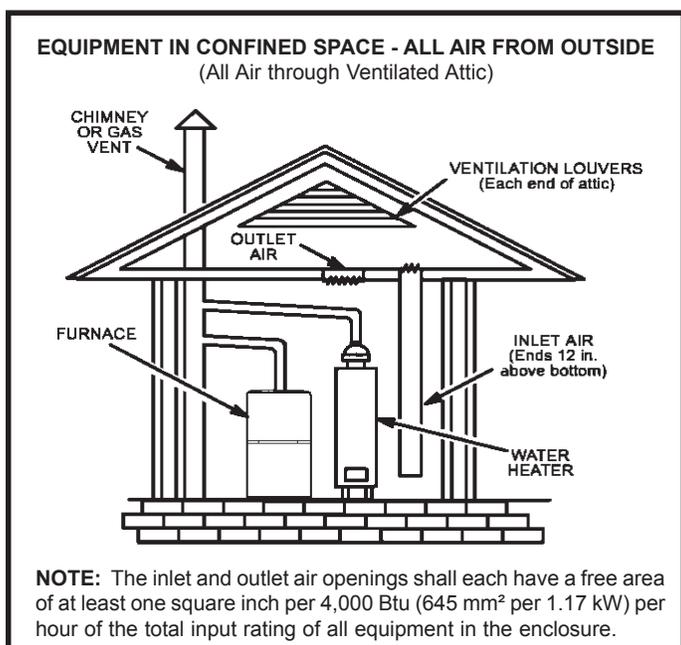


Figure 5

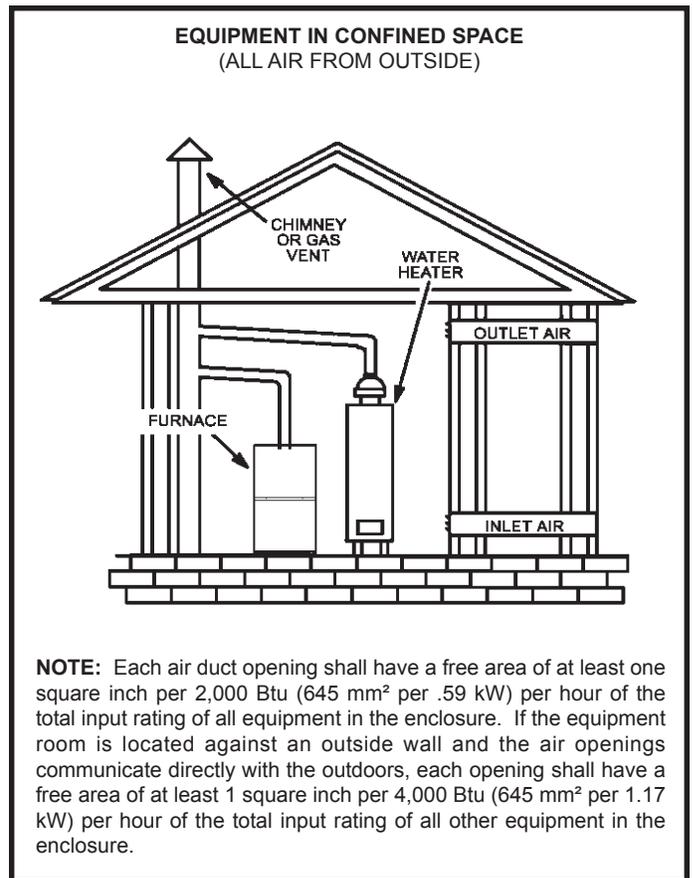


Figure 6

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 blower motors are equipped with three flexible legs and one rigid leg. See Figure 7. 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.

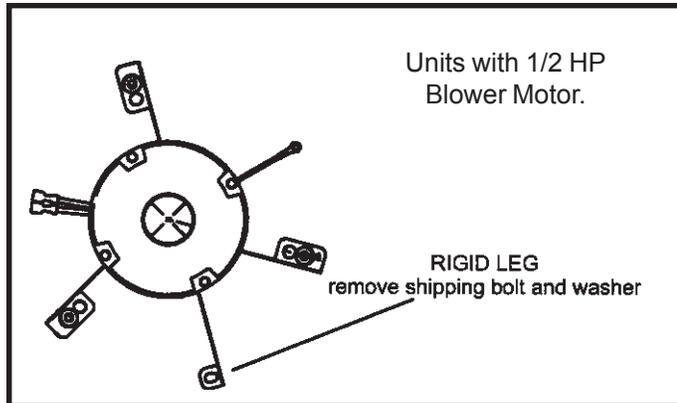
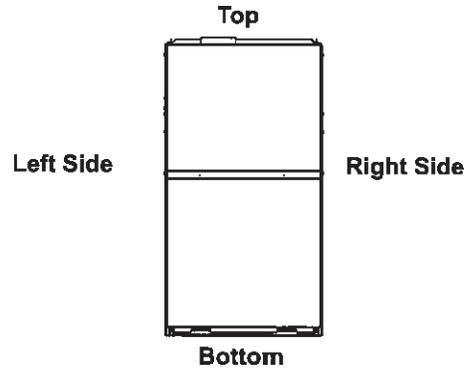


Figure 7

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 8.

Upflow Application Installation Clearances		
		
Type of Vent Connector	Type C	Type B1
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 inches if a single wall vent is used on 14-1/2 inch cabinets.

Figure 8

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 9.
2. **Single side return air with optional return airbase.** See Figure 10.
3. **Bottom return air.**
4. **Return air from both sides.**
5. **Bottom and one side return air.**

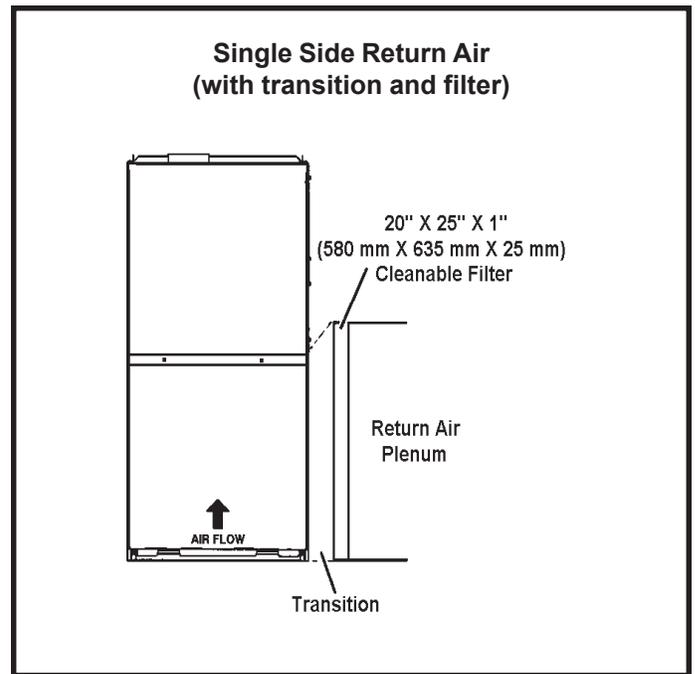


Figure 9

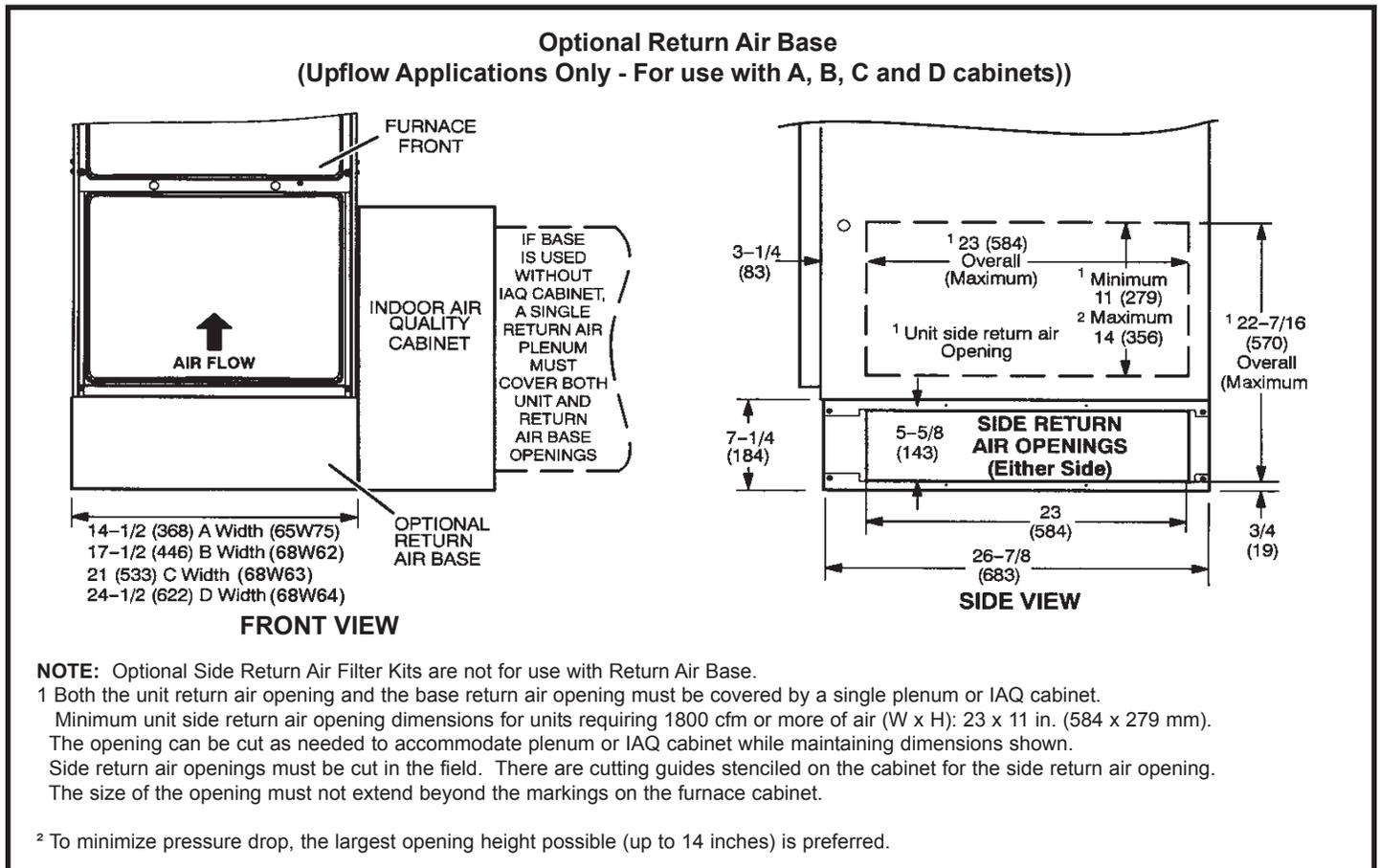


Figure 10

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 11.

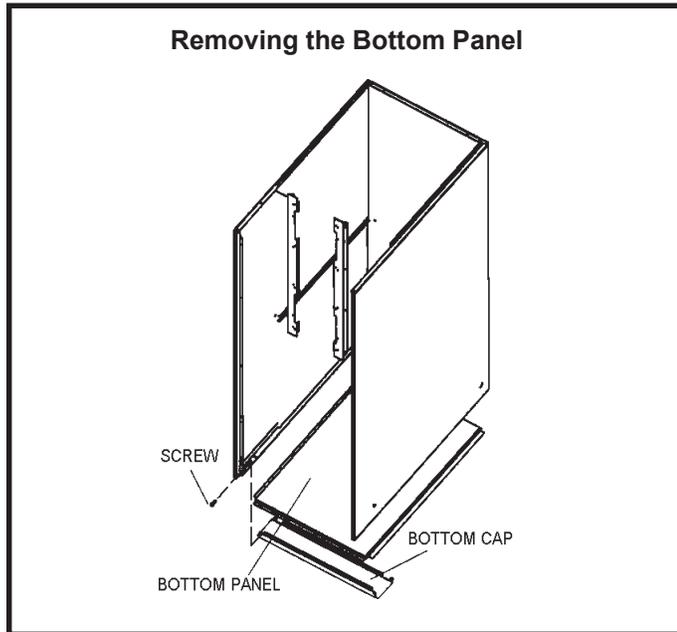


Figure 11

Horizontal Application Installation Clearances

The diagram shows a top-down view of a furnace in a horizontal application. The top and bottom are labeled. The left and right ends are also labeled. An arrow indicates air flow from the right end towards the left end.

Vent Connector Type	Type C	Type B1
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 21 in. (610 mm) for front service access.
 ± For installations on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.

Figure 12

Horizontal Applications

The furnace can be installed in horizontal applications. Order horizontal suspension kit (51W10) from Allied Air, 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 12.

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 13, or install the furnace on a platform, as shown in Figure 14.

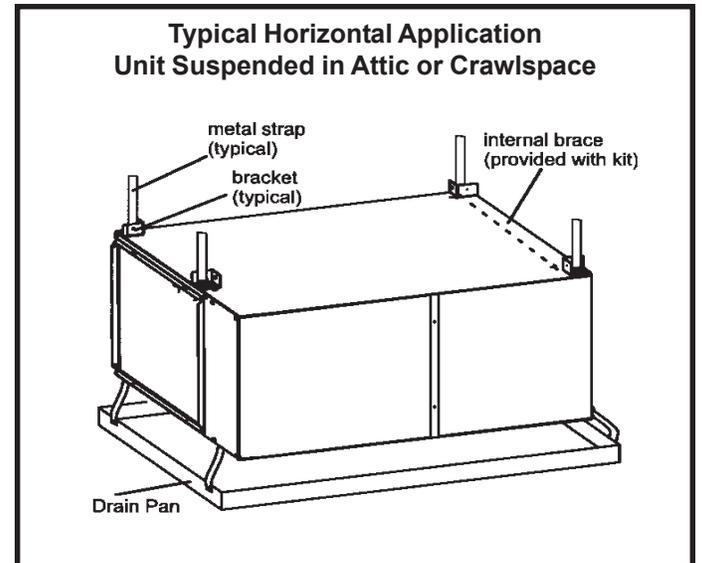


Figure 13

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 11.

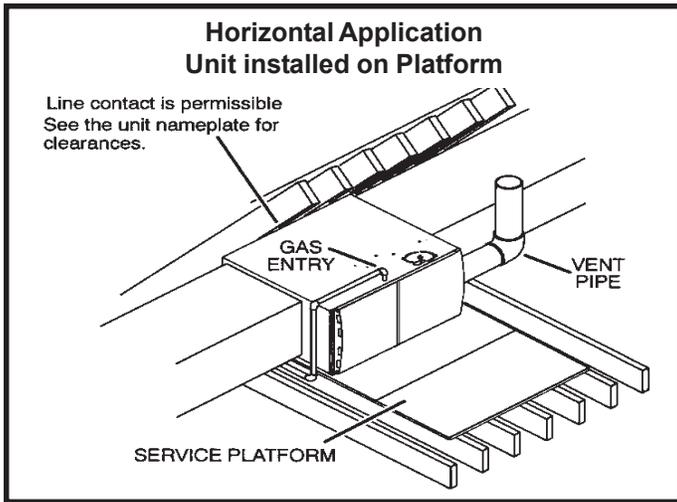


Figure 14

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	16 X 25 X 1
C - 21"	16 X 25 X 1	20 X 25 X 1
D - 24-1/2"	16 X 25 X 1	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 16 shows the combustion air inducer as shipped from the factory.**

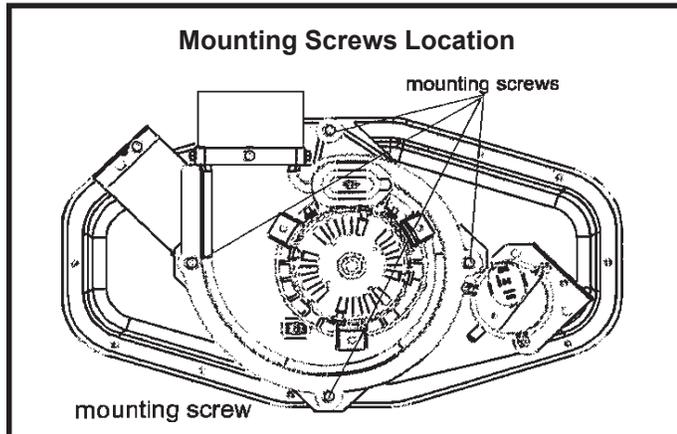


Figure 15

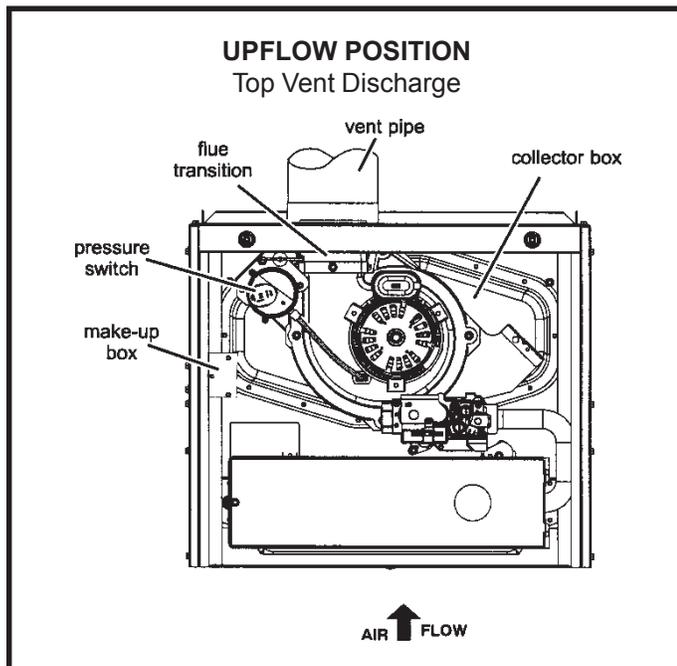


Figure 16

! 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 Figures 16 through 22.

1. Remove the four mounting screws (Figure 15) 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 or 9 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.

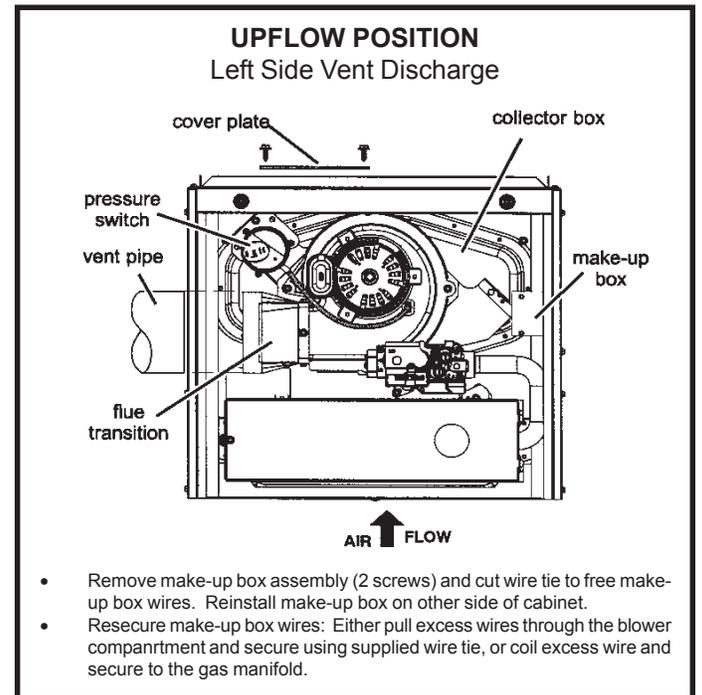


Figure 17

- 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.

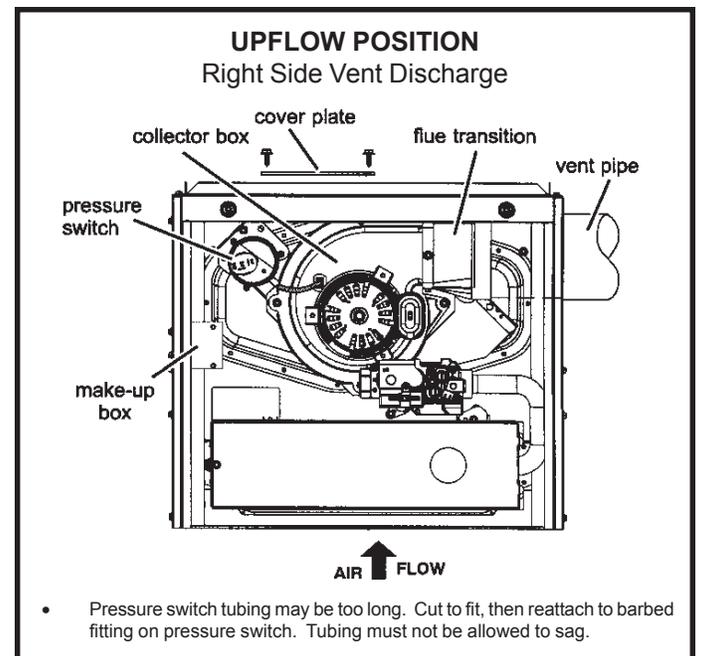


Figure 18

- Pressure switch tubing may be too long. Cut to fit, then reattach to barbed fitting on pressure switch. Tubing must not be allowed to sag.

Horizontal Position

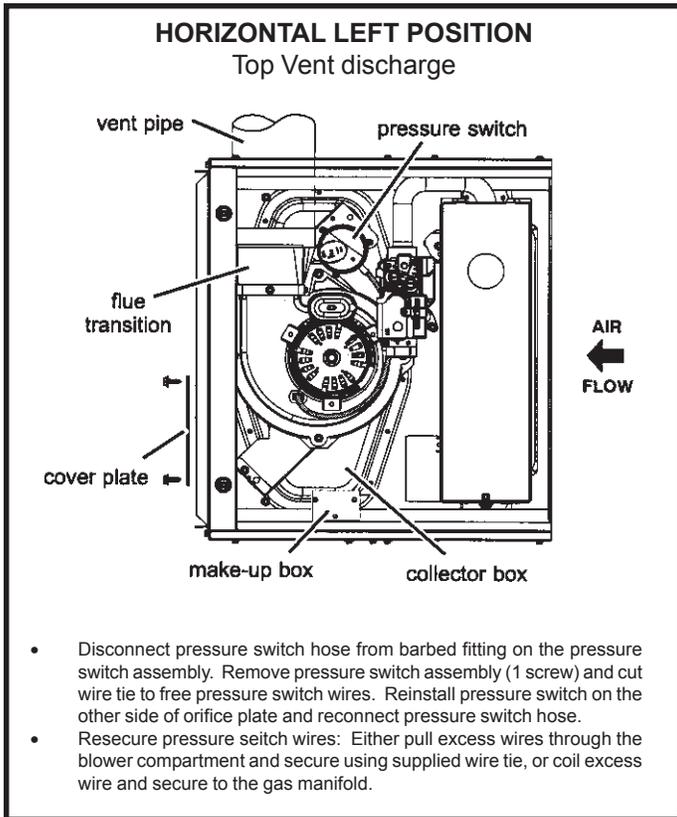


Figure 19

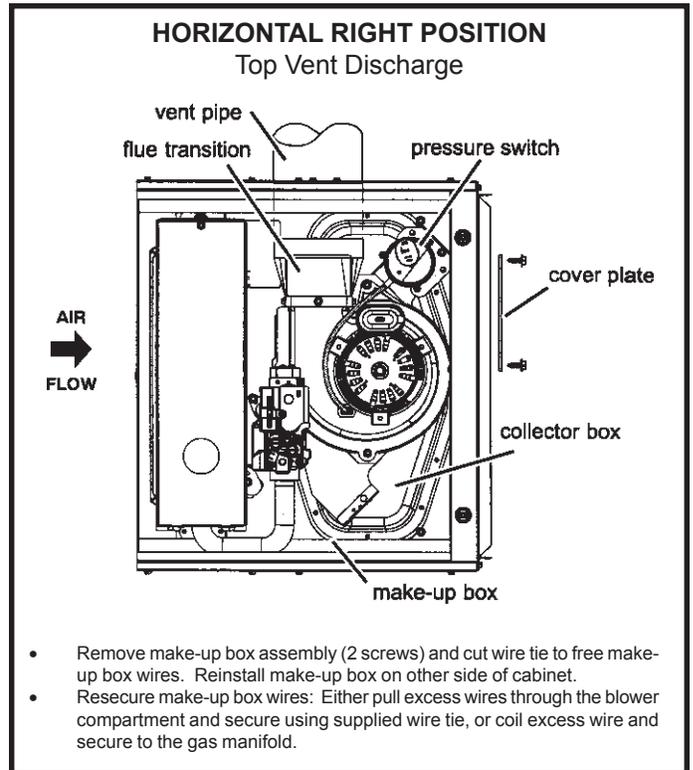


Figure 21

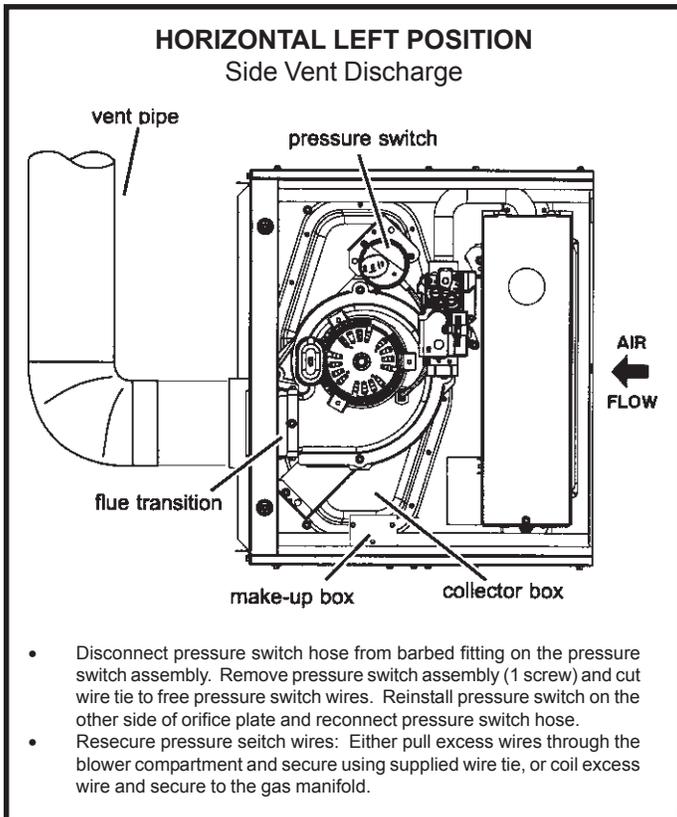


Figure 20

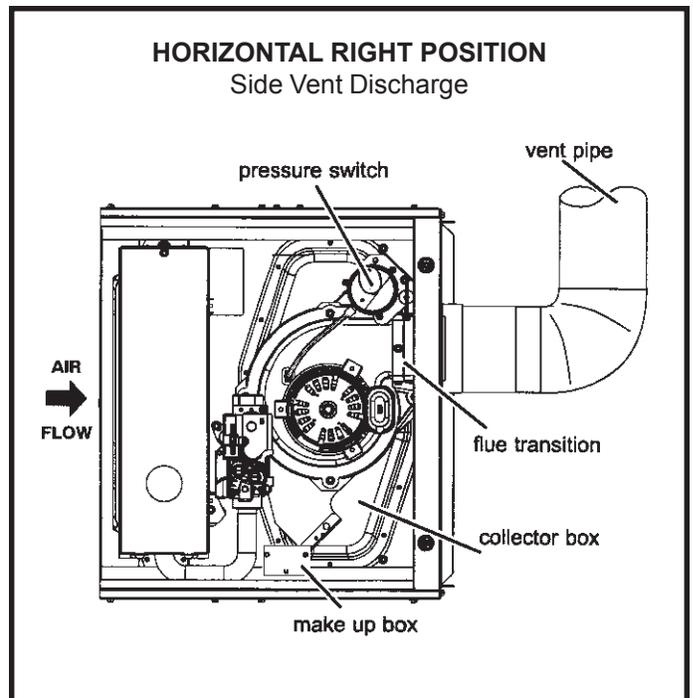


Figure 22

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 23. 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.

Vent Connection

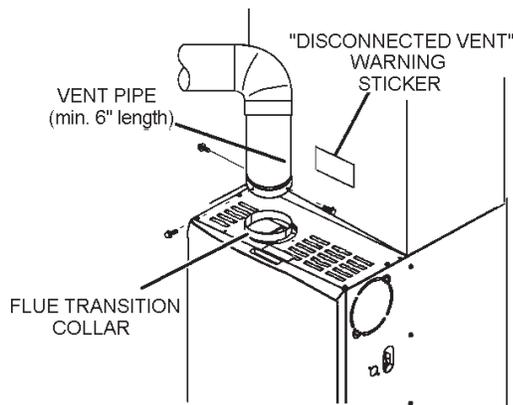


Figure 23

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 23.

Install the first vent connector elbow at a minimum of six inches (152 mm) from the furnace vent outlet. See Figure 23.

Venting Using a Masonry Chimney

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

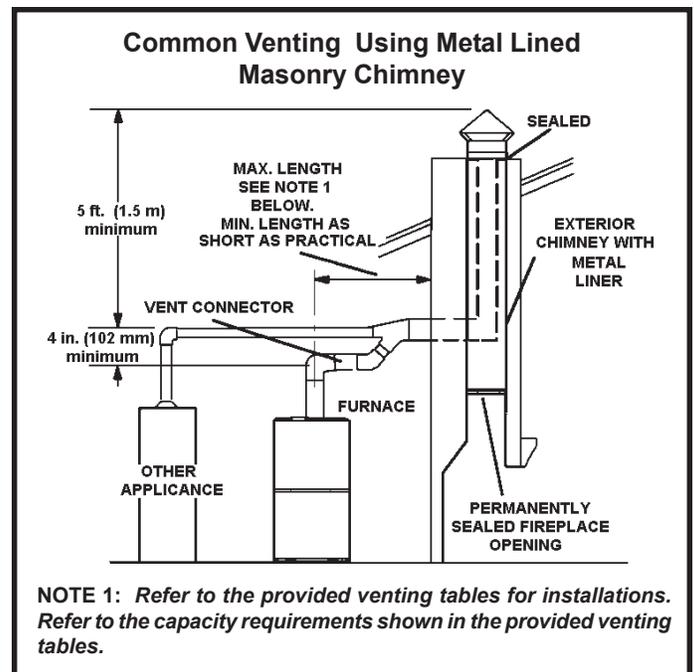
Masonry chimneys used to vent Category I central furnaces must be either tile lined or lined with a listed metal lining system or dedicated gas vent. Unlined masonry chimneys are prohibited. See Figures 24 and 25 for common venting.

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. See Figure 24.



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

Figure 24

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

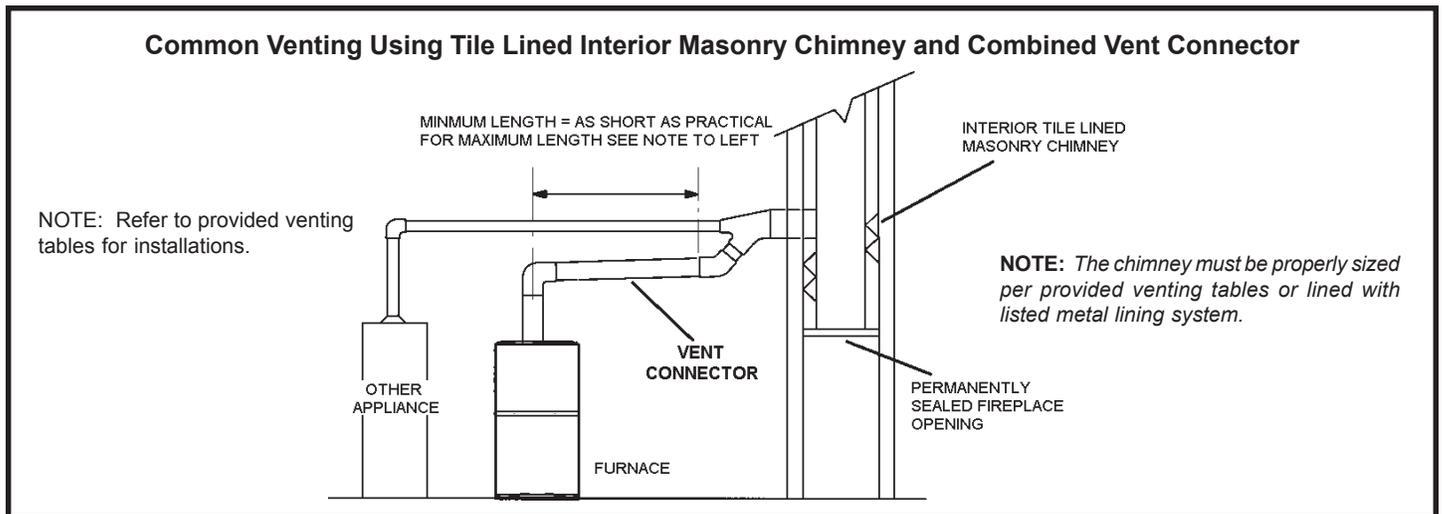


Figure 25

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 draft hood 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 B 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 these furnaces according to these instructions:

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, draft hood 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, draft hood 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 (Tables 3 and 4) 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 (5, 6,7, and 8) 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 inches (mm)	Maximum Horizontal Connector Length feet (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 doublewall 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

**Capacity of Type B Double Wall Vents with Single Wall Metal 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	38	77	59	151	85	249	126	373
	2	39	51	60	96	85	156	123	231
	4	NR	NR	74	92	102	152	146	225
	6	NR	NR	83	89	114	147	163	220
8	0	37	83	58	164	83	273	123	412
	2	39	56	59	108	83	176	121	261
	5	NR	NR	77	102	107	168	151	252
	8	NR	NR	90	95	122	161	175	243
10	0	37	87	57	174	82	293	120	444
	2	39	61	59	117	82	193	119	287
	5	52	56	76	111	105	185	148	277
	10	NR	NR	97	100	132	171	188	261
15	0	36	93	56	190	80	325	116	499
	2	38	69	57	136	80	225	115	337
	5	51	63	75	128	102	216	144	326
	10	NR	NR	95	116	128	201	182	308
	15	NR	NR	NR	NR	158	186	220	290
20	0	35	96	54	200	78	346	114	537
	2	37	74	56	148	78	248	113	375
	5	50	68	73	140	100	239	141	363
	10	NR	NR	93	129	125	223	177	344
	15	NR	NR	NR	NR	155	208	216	325
	20	NR	NR	NR	NR	186	192	254	306
30	0	34	99	53	211	76	372	110	584
	2	37	80	55	164	76	281	109	429
	5	49	74	72	157	98	271	136	417
	10	NR	NR	91	144	122	255	171	397
	15	NR	NR	115	131	151	239	208	377
	20	NR	NR	NR	NR	181	223	246	357
	30	NR	NR	NR	NR	NR	NR	NR	NR

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 4

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	87	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 5

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 6

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

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	1	NR	NR	NR	NR	NR	NR	NR	NR
	2	NR	NR	NR	NR	NR	NR	168	182
	3	NR	NR	NR	NR	121	131	175	198
8	1	NR	NR	NR	NR	NR	NA	NR	NR
	2	NR	NR	NR	NR	125	126	184	193
	3	NR	NR	NR	NR	130	138	191	208
10	1	NR	NR	NR	NR	119	121	182	186
	2	NR	NR	84	85	124	134	189	203
	3	NR	NR	89	91	129	144	197	217
15	1	NR	NR	79	87	116	138	177	214
	2	NR	NR	83	94	121	150	185	230
	3	NR	NR	87	100	127	160	193	243
20	1	49	56	78	97	115	152	175	238
	2	52	59	82	103	120	163	182	252
	3	55	62	87	107	125	172	190	264
30	1	47	60	77	110	112	175	169	278
	2	51	62	81	115	117	185	177	290
	3	54	64	85	119	122	193	185	300

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 7

Common Vent Capacity
Type B Double Wall Vents with Single Wall Metal 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	NA	78	NA	113	200	158	304	244
8	NA	87	NA	126	218	173	331	269
10	NA	94	163	137	237	189	357	292
15	121	108	189	159	275	221	416	343
20	131	118	208	177	305	247	463	383
30	145	132	236	202	350	286	533	446

Table 8

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 9 lists recommended pipe sizes for typical 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 38.
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.*

Gas Pipe Capacity - ft³/hr (m³/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 (919.25)	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)

Note: Capacity given in cubic feet (m³) of gas per hour and based on 06.0 specific gravity gas.

Table 9

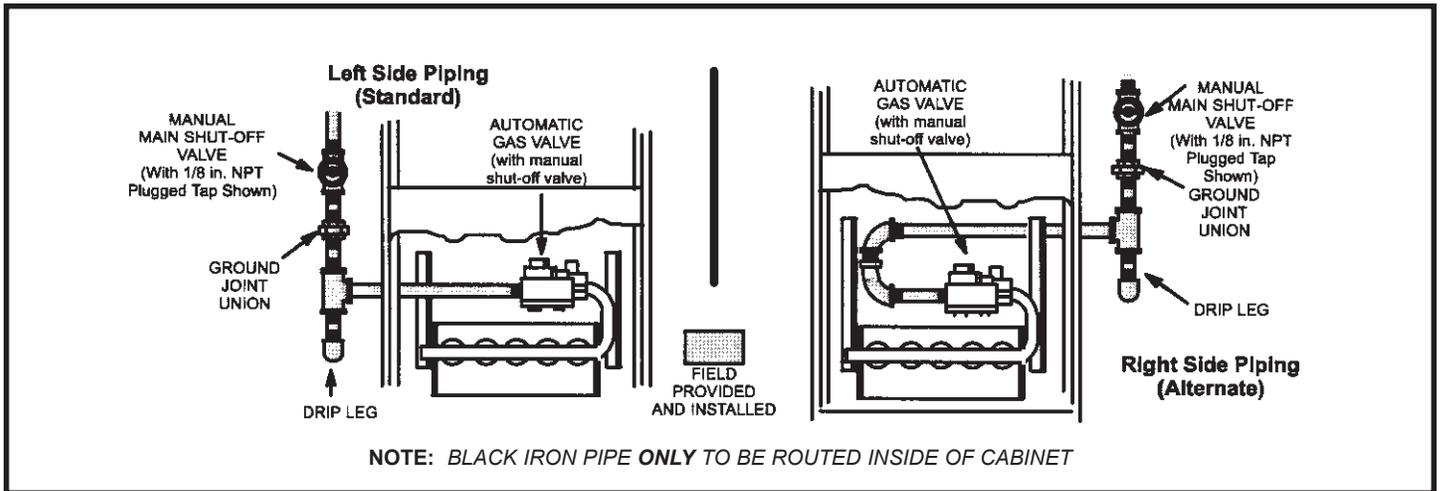


Figure 26

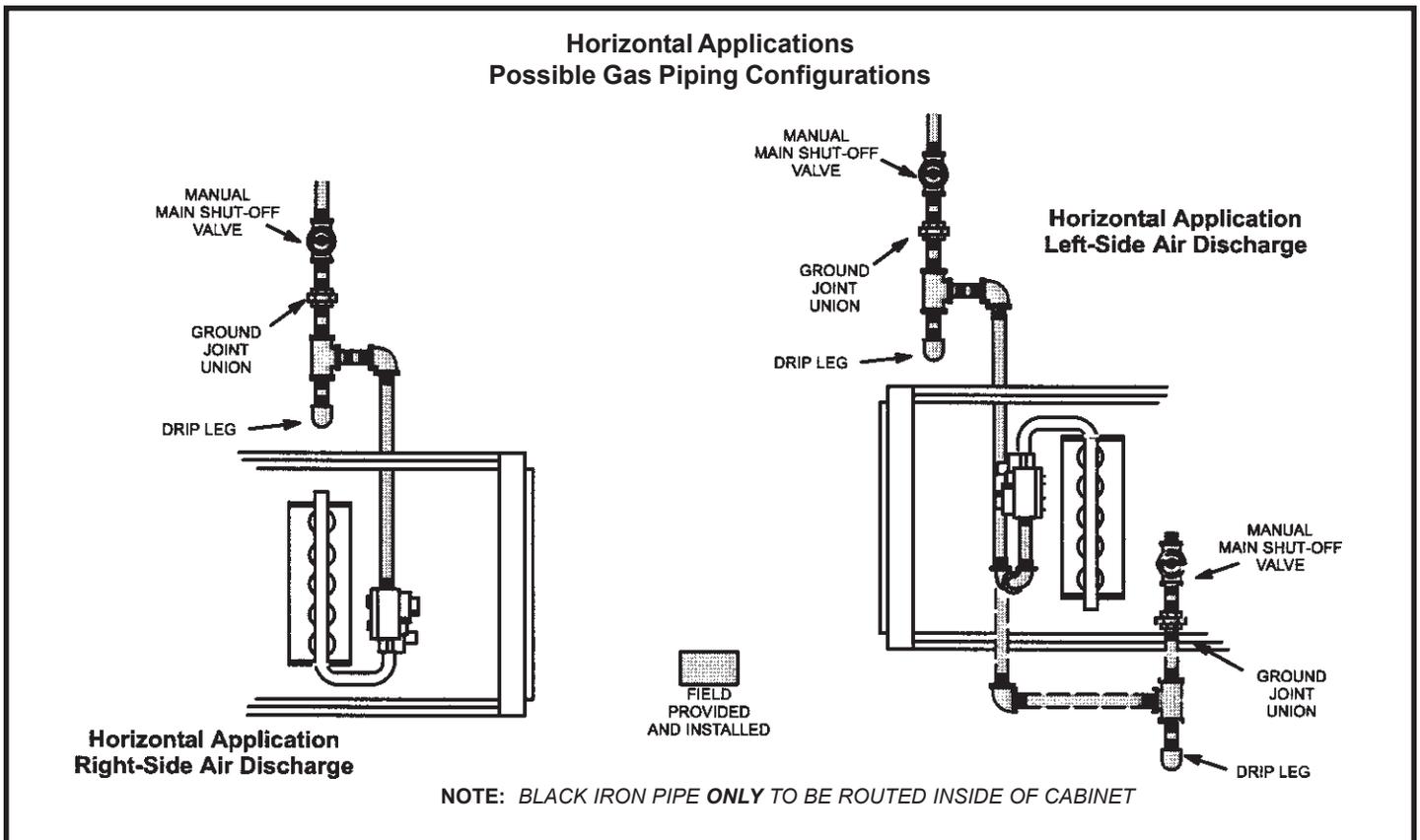


Figure 27

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 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 28. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa, 14 inches w.c.).

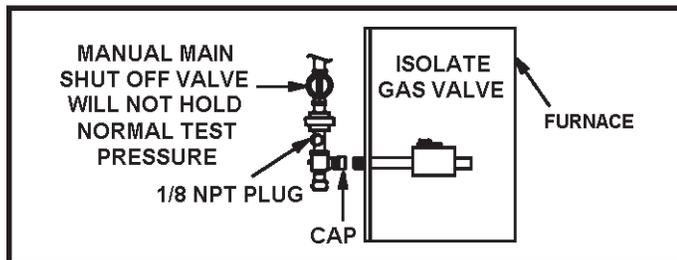


Figure 28

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.

INTERIOR MAKE-UP BOX INSTALLATION

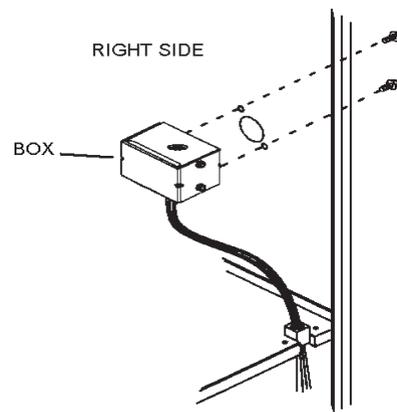


Figure 29

INTERIOR MAKE-UP BOX INSTALLATION

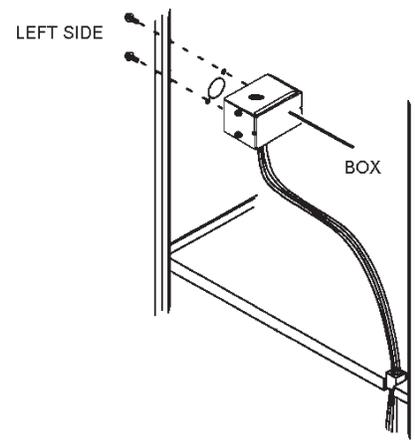


Figure 30

Refer to Figure 40 for schematic wiring diagram and troubleshooting and Figure 41 for field wiring.

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

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

2. Holes are on both sides of the furnace cabinet to facilitate wiring.
3. Install a separate (properly sized) disconnect switch near the furnace so that power can be turned off for servicing.

Model	Maximum Over-Current Protection (Amps)
07012A12, 090B12	15
090B16, 090C20, 110C20, 135D20	20

Table 10

- 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 and the field wiring diagram shown in Figure 41. 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.*

- One line voltage "EAC" 1/4" spade terminal is provided on the furnace integrated control. Any electronic air cleaner or other 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. See Figure 41 for control configuration. This terminal is energized when the indoor blower is operating.
- One line voltage "HUM" 1/4" spade terminal is provided on the furnace integrated control. 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. See Figure 41 for control configuration. This terminal is energized in the heating mode whenever the combustion air inducer is operating.
- One 24V "H" terminal is provided on the furnace integrated control terminal block. Any humidifier rated up to 0.5 amp can be connected to this terminal with the ground leg of the circuit being connected to either ground or the "C" terminal. See Figure 41 for control configuration.
- Install the room thermostat according to the instructions provided with the thermostat. If the furnace is being matched with a heat pump, refer to the instruction packaged with the dual fuel thermostat.

Indoor Blower Speeds

- When the thermostat is set to "FAN ON," the indoor blower will run continuously at approximately 38% of the second stage cooling speed when there is no cooling or heating demand.
- When this unit is running in the heating mode, the indoor blower will run on the heating speed designated by the positions of DIP switches 11 and 12.
- When there is a cooling demand, the indoor blower will run on the cooling speed designated by the positions of DIP switches 5 and 6.

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 \pm 10% (Range: 108 volts to 132 volts).
- The furnace operates at 60 Hz \pm 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.

Electrical Wiring



Risk of electrical shock. Disconnect electrical power at the circuit breaker or service panel before making electrical connections. Failure to disconnect power supplies can result in property damage, personal injury, or death.

The furnace must be grounded and wired in accordance with local codes or, in the absence of local codes, with the National Electrical Code ANSI/NFPA No. 70 (latest edition) and/or CSA C22.1 Electrical Code (latest edition) if an external electrical source is utilized.

In all instances, other than wiring for the thermostat, the wiring to be done and any replacement of wire shall conform with the temperature limitation for Type T wire –63°F (35°C) rise.

Connect a sufficiently sized wire with ground to the furnace's line voltage connections and ground lug. Refer to the furnace rating plate for electrical characteristics to be used in sizing field supply wiring and overcurrent protection.

The line voltage supply should be routed through a readily accessible disconnect located within sight of the furnace. A junction box on the furnace side panel is provided for line voltage connections. Refer to the furnace wiring diagram for specific connection information.

Proper polarity of the supply connections (“HOT” and “NEUTRAL”) must be observed to ensure that safety controls provide the protection intended.

A connection to the ground lug and actual earth ground (typically a ground stake or buried steel pipe) must be maintained for proper operation.

Thermostat

Install a room thermostat according to the instructions furnished with it. Select a location on an inside wall that is not subject to drafts, direct sunshine, or other heat sources. The initial heat anticipator setting should be equal to the total current draw of the control circuit. Low voltage thermostat connections are to be made to the integrated ignition/blower control board as indicated on the wiring diagram.

Single Stage Thermostat Operation (A80UH2V and 80G1UH2V Models)

The automatic heat staging option allows a single stage thermostat to be used with two stage furnace models (A80UH2V or 80G1UH2V). To activate this option, move the jumper pin (see Figure 31) to desired setting (5 minutes or 10 minutes). The furnace will start on 1st stage heat and stay at 1st stage heat for the duration of the selected time before switching to 2nd stage heat.

W1 on the control board must be connected to W1 on the thermostat.

Humidifier

Terminals are provided on the integrated ignition/blower control board for connection to a 120-volt humidifier. The “HUM” terminal is energized whenever the thermostat calls for heat. See the furnace wiring diagram for specific connection information.

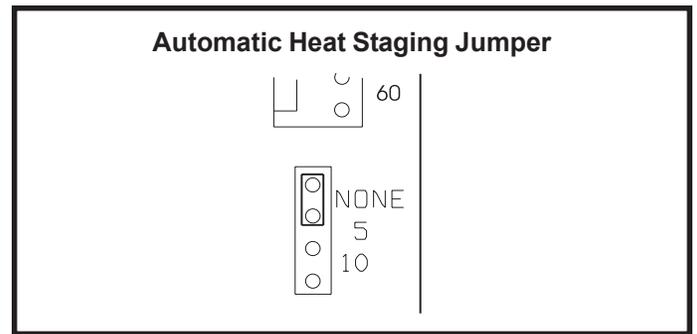


Figure 31

Electronic Air Cleaner

Terminals are provided on the integrated ignition/blower control board for connection of a 120-volt electronic air cleaner. The “EAC” terminal is energized whenever the thermostat calls for heat, cooling, or continuous blower. See furnace wiring diagram for specific connection information.

Variable Speed Features

This furnace is equipped with a variable speed circulation air blower motor that will deliver a constant airflow within a wide range of external static pressures. Other features of this variable speed motor include:

Soft Start

The variable speed motor will slowly ramp up to normal operating speed. This minimizes noise and increases comfort by eliminating the initial blasts of air encountered with standard motors.

Soft Stop

At the end of a cooling or heating cycle, the variable speed motor will slowly ramp down after a short blower “off” delay. If continuous blower operation has been selected, the variable speed motor will slowly ramp down until it reaches the airflow for that mode.

Passive and Active Dehumidification

Passive Dehumidification

For situations where humidity control is a problem, a dehumidification feature has been built into the variable speed motor. At the start of each cooling cycle, the variable speed motor will run at 82% of the rated airflow for 7.5 minutes. After 7.5 minutes has elapsed, the motor will increase to 100% of the rated airflow.

Active Dehumidification

To achieve additional dehumidification, clip the jumper wire located below the DEHUM terminal on the integrated ignition/blower control board and connect a humidity control that opens on humidity rise to the DEHUM and R terminals. The DEHUM terminal on the control board must be connected to the normally closed contact of the humidity control so that the board senses an open circuit on high humidity. In this setup, the variable speed motor will operate at a 18% reduction in the normal cooling airflow rate when there is a call for dehumidification.

Both the passive and active dehumidification methods described above can be utilized on the same furnace.

Circulating Airflow Adjustments

Cooling Mode

The units are factory set for the highest airflow for each model. Adjustments can be made to the cooling airflow by repositioning the jumper plug marked COOL – A, B, C, D (see Figure 32) based on the information found in the table. To determine what CFM the motor is delivering at any time, count the number of times the amber LED on the control board flashes. Each flash signifies 100 CFM; count the flashes and multiply by 100 to determine the actual CFM delivered (for example: 10 flashes x 100 = 1000 CFM).

Heating Mode

The unit as shipped is factory set to run at the middle of the heating rise range as shown on the unit rating plate. If higher or lower rise is desired, change the airflow 15% up or down by moving the ADJUST jumper plug (see Figure 32) from the NORM position to the (+) or (–) position. This adjustment will also cause the cooling airflow to be raised or lowered by 15%.

The TEST position on the ADJUST tap is not used.

The jumper plug on the HEAT tap should remain in the position (A, B, C, or D) listed in the HEAT Setting column in the table found in Figure 32. Changing the setpoints may not increase or decrease heating blower speeds. In some cases, running the blower with the heat settings in the wrong position may cause the furnace to operate outside the furnace's intended temperature rise range.

Continuous Blower Operation

The comfort level of the living space can be enhanced when using this feature by allowing continuous circulation of air between calls for cooling or heating. The circulation of air occurs at half the full cooling airflow rate.

To engage the continuous blower operation, place the fan switch on the thermostat into the **ON** position. A call for fan from the thermostat closes R to G on the ignition control board. The control waits for a 1 second thermostat debounce delay before responding to the call for fan by ramping the circulating blower up to 50% of the cooling speed. When the call for continuous fan is satisfied, the control immediately ramps down the circulating blower.

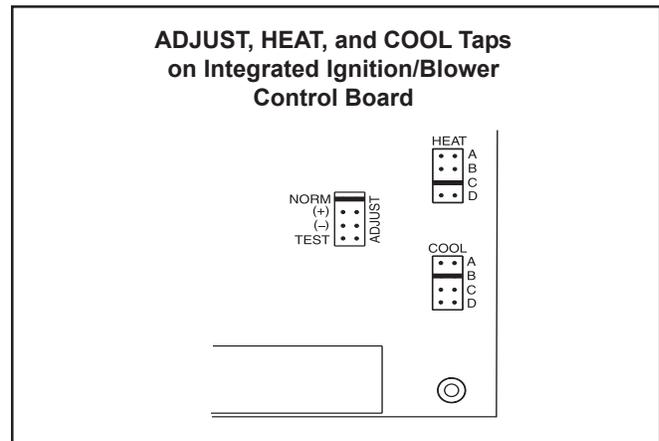


Figure 32

ADJUSTING AIRFLOW

				BOTTOM INLET							
				Heating CFM @ .50 Static				Cooling CFM @ .50 Static			
Model	Motor Hp	Stage	Speed Adjustment *	Heat Setting A	Heat Setting B	Heat Setting C	Heat Setting D	Cool Setting A	Cool Setting B	Cool Setting C	Cool Setting D
A80UH2V070A12	½	2nd	Norm	715	900	934	1026	920	985	1105	1225
		1st	Norm	679	754	842	937	690	735	795	885
A80UH2V090B12	½	2nd	Norm	1091	1348	1359	1484	875	1055	1145	1245
		1st	Norm	1013	1122	1257	1372	565	675	775	785
A80UH2V090B16	1	2nd	Norm	1079	1380	1390	1496	940	1200	1405	1600
		1st	Norm	996	1033	1271	1399	600	810	960	1090
A80UH2V090C20	1	2nd	Norm	1199	1450	1505	1662	1440	1685	1910	2120
		1st	Norm	1076	1147	1403	1541	980	1205	1395	1545
A80UH2V110C20	1	2nd	Norm	1405	1759	1773	1977	1401	1564	1714	1877
		1st	Norm	1301	1361	1621	1797	969	1075	1181	1336
A80UH2V135D20	1	2nd	Norm	1524	1680	1712	2090	1420	1512	1698	1898
		1st	Norm	1413	1514	1584	1921	964	1014	1181	1382

* Speed Adjustment (+) or (-) 10% by moving jumper from NORM.

				RIGHT INLET							
				Heating CFM @ .50 Static				Cooling CFM @ .50 Static			
Model	Motor Hp	Stage	Speed Adjustment *	Heat Setting A	Heat Setting B	Heat Setting C	Heat Setting D	Cool Setting A	Cool Setting B	Cool Setting C	Cool Setting D
A80UH2V070A12	½	2nd	Norm	707	890	925	1013	926	1003	1104	1213
		1st	Norm	673	750	864	949	689	726	795	859
A80UH2V090B12	½	2nd	Norm	1082	1335	1350	1456	872	1032	1115	1235
		1st	Norm	987	1085	1236	1335	604	684	759	839
A80UH2V090B16	1	2nd	Norm	1075	1384	1394	1515	897	1158	1346	1499
		1st	Norm	996	1033	1271	1399	571	778	930	1040
A80UH2V090C20	1	2nd	Norm	1139	1400	1464	1626	1176	1388	1543	1737
		1st	Norm	1040	1098	1343	1491	814	957	1062	1215
A80UH2V110C20	1	2nd	Norm	1368	1709	1750	1904	1375	1526	1687	1843
		1st	Norm	1250	1323	1573	1730	942	1048	1154	1277
A80UH2V135D20	1	2nd	Norm	1509	1650	1681	2050	1356	1434	1633	1862
		1st	Norm	1383	1491	1567	1889	958	1005	1176	1356

*Speed Adjustment (+) or (-) 10% by moving jumper from NORM.

				RIGHT INLET w/RAB (with Return Air Base)							
				Heating CFM @ .50 Static				Cooling CFM @ .50 Static			
Model	Motor Hp	Stage	Speed Adjustment *	Heat Setting A	Heat Setting B	Heat Setting C	Heat Setting D	Cool Setting A	Cool Setting B	Cool Setting C	Cool Setting D
A80UH2V070A12	½	2nd	Norm	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		1st	Norm	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
A80UH2V090B12	½	2nd	Norm	1179	1340	1360	1469	879	1005	1113	1217
		1st	Norm	1094	1204	1343	1474	619	700	805	860
A80UH2V090B16	1	2nd	Norm	1079	1382	1390	1496	904	1126	1347	1525
		1st	Norm	981	1045	1277	1413	599	762	928	1045
A80UH2V090C20	1	2nd	Norm	1144	1450	1464	1615	1164	1379	1558	1753
		1st	Norm	1022	1095	1342	1496	769	968	1090	1245
A80UH2V110C20	1	2nd	Norm	1367	1722	1770	1933	1469	1536	1654	1813
		1st	Norm	1252	1318	1576	1749	1008	1038	1159	1307
A80UH2V135D20	1	2nd	Norm	1501	1650	1686	2052	1364	1448	1649	1826
		1st	Norm	1375	1484	1558	1875	954	1003	1146	1338

*Speed Adjustment (+) or (-) 10% by moving jumper from NORM.

Table 11

START-UP

Lighting Instructions

For Your Safety, Read Before Operating

WARNING

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

These furnaces are equipped with an ignition device which automatically lights the burners. **Do not try to light the burners by hand.**

Before operating, 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.

What to do if you smell gas:

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

Do not use this furnace if any part has been under water. Immediately call a qualified service technician to inspect the furnace and to replace any part of the control system and gas control which has been under water.

IMPORTANT: Refer to the Lighting Instruction label on the furnace for instructions on operating the specific controls used on your unit.

To Start Furnace:

CAUTION

Be sure the manual gas control has been in the "OFF" position for at least 5 minutes before starting the unit. Do not attempt to manually light the burners.

1. Set the room thermostat to lowest setting.
2. Remove burner access door.
3. Move the gas control knob to the "ON" position. Use only your hand to turn the gas control knob. Never use tools. If the knob will not turn by hand, don't try to repair it; call a qualified service technician. **Force or attempted repair may result in a fire or explosion.**
4. Replace the burner access door.
5. Turn on the electrical power to the furnace.
6. Set room thermostat to a point above room temperature to light the burners. After the burners have ignited, set room thermostat to desired temperature.

To Shut Down Furnace:

1. Set the room thermostat to the lowest setting.
2. Turn off all electric power to the furnace.
3. Remove burner access door.
4. Shut off gas by moving gas control knob to "OFF" position.
5. Replace the burner access door.

WARNING

Should overheating occur or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

OPERATION

Sequence of Operation (see Figures 33 – 37)

Heating

On a call for heat from the room thermostat, the control board performs a 1 second self check. Upon confirmation that the pressure switch contacts are in an open position, the control energizes the combustion blower on high speed. The control then checks for adequate combustion air by making sure the low-fire pressure switch contacts are closed.

The igniter energizes and is allowed to warm up for 7 seconds before the gas valve energizes on 1st stage and burners ignite. 45 seconds after the control confirms ignition has occurred, the control drops the combustion blower to low speed.

The circulating blower ramps up to 50% of 1st stage heat speed and operates at that speed for one minute (including ramp up time), then at 75% of 1st stage heat speed for an additional minute. After that, the circulating blower operates at full 1st stage heat speed until either the heat call is satisfied or the thermostat initiates a call for 2nd stage heat. On a call for 2nd stage heat, the control energizes the circulating air blower on full CFM 2nd stage heat.

If the automatic heat staging option is being used (see Single Stage Thermostat Operation on page 27), the furnace does not switch to 2nd stage heat in response to a call from the thermostat but instead operates at 1st stage heat for the duration of the selected time before automatically switching to 2nd stage heat.

When the call for heat is satisfied, the gas valve and combustion air blower shut down. The control board shuts off the gas valve and runs the combustion blower for an additional 15 seconds. The circulating air blower continues to run for 2 minutes at 82% of the selected heating speed (low fire or high fire) before ramping down.

In the event the unit loses ignition, the control will attempt to recycle up to five times before it goes into a 1 hour lockout. Lockout may be manually reset by removing power from the control for more than 1 second or removing the thermostat call for heat for more than 3 seconds.

If during a heating cycle the limit control senses an abnormally high temperature and opens, the control board de-energizes the gas valve and the combustion blower while the circulating blower ramps up to 2nd stage heat speed. The circulating blower remains energized until the limits are closed.

Fan On

When the thermostat is set for continuous fan operation and there is no demand for heating or cooling, a call for fan closes

the R to G circuit and the circulating blower motor runs at 50% of the selected cooling CFM until switched off. When the call for fan is turned off, the control de-energizes the circulating blower.

Cooling

The unit is set up at the factory for single stage cooling. For two stage cooling operation, clip the jumper wire located between the Y to Y2 terminals on the integrated ignition/blower control board.

If the active dehumidification feature is enabled, the circulating blower runs at 82% of the selected cooling speed as long as there is a call for dehumidification.

▲ IMPORTANT

The system must not be in either the passive or active dehumidification mode when charging a cooling system.

Single Stage Cooling

A call for cooling from the thermostat closes the R to Y circuit on the integrated ignition/blower control board. The control waits for a 1-second delay before energizing the circulating blower to 82% of the selected cooling CFM (passive dehumidification mode). After 7.5 minutes, the circulating blower automatically ramps up to 100% of the selected cooling airflow. When the call for cooling is satisfied, the circulating blower ramps back down to 82% of the selected cooling airflow for 1 minute, then shuts off.

Two Stage Cooling

A call for 1st stage cooling from the thermostat closes the R to Y circuit on the control board. The control waits for a 1-second delay before energizing the circulating blower. The blower motor runs at 57% of the selected air flow for the first 7.5 minutes of the 1st stage cooling demand (passive dehumidification mode). After 7.5 minutes, the blower motor runs at 70% of the selected cooling air flow until 1st stage cooling demand is satisfied.

A call for 2nd stage cooling from the thermostat closes the R to Y2 circuit on the control board. The blower motor ramps up to 100% of the selected cooling air flow. When the demand for cooling is met, the blower ramps down to Y1 until satisfied, then ramps down to 57% for 1 minute, then turns off.

Heat Pump

For heat pump operation, clip the jumper wire located below the O terminal on the integrated ignition/blower control board. In heat pump mode, a call for heat will result in the circulating air blower operating at the selected cooling airflow after a brief ramp-up period.

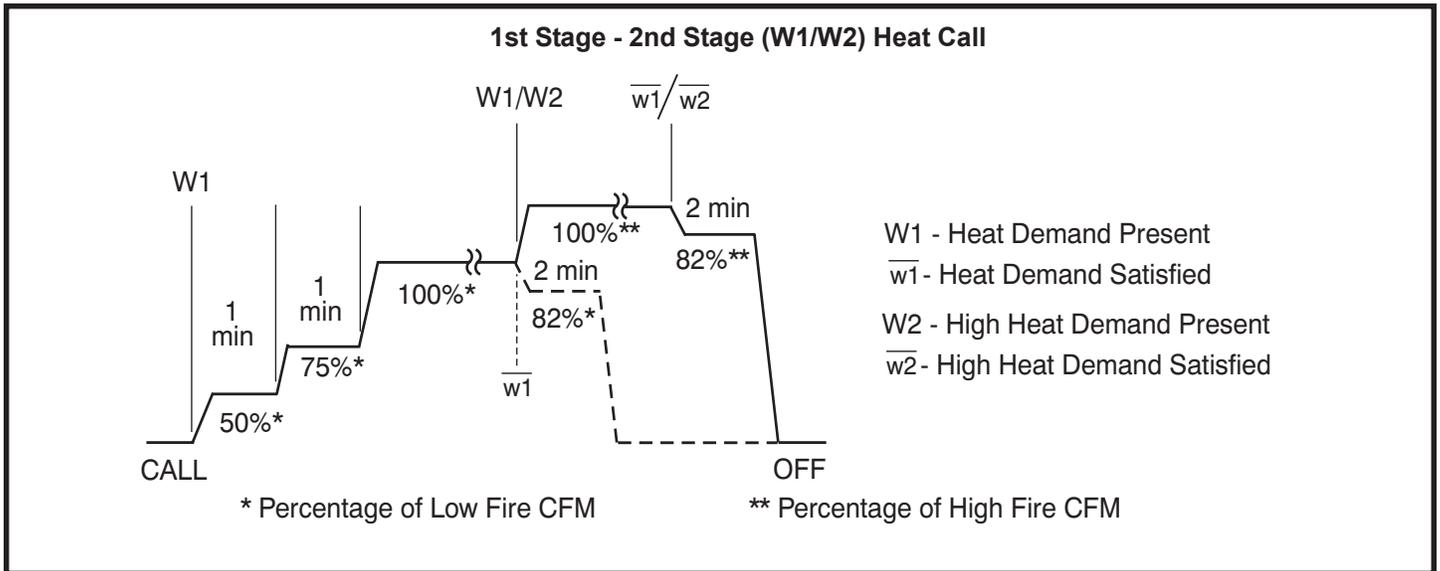


Figure 33

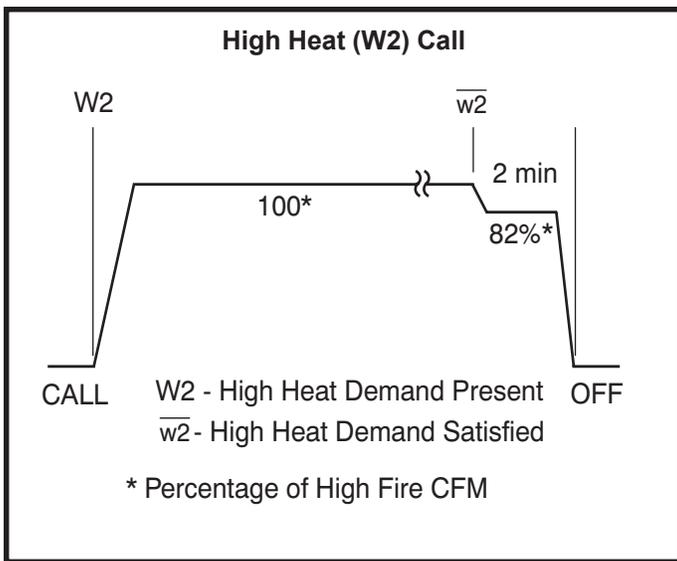


Figure 34

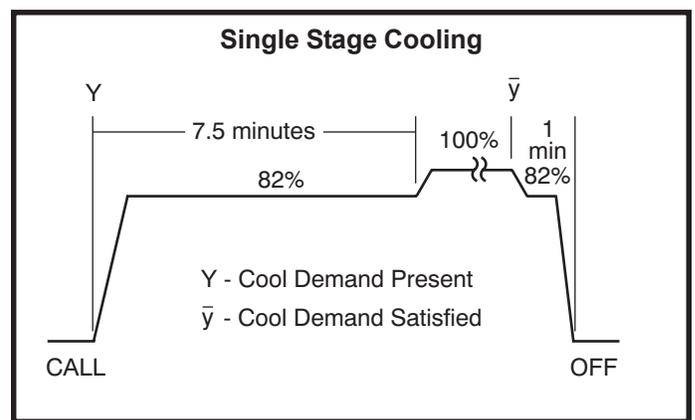


Figure 36

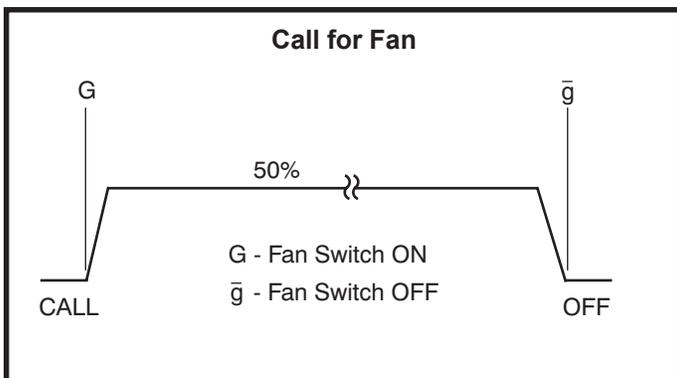


Figure 35

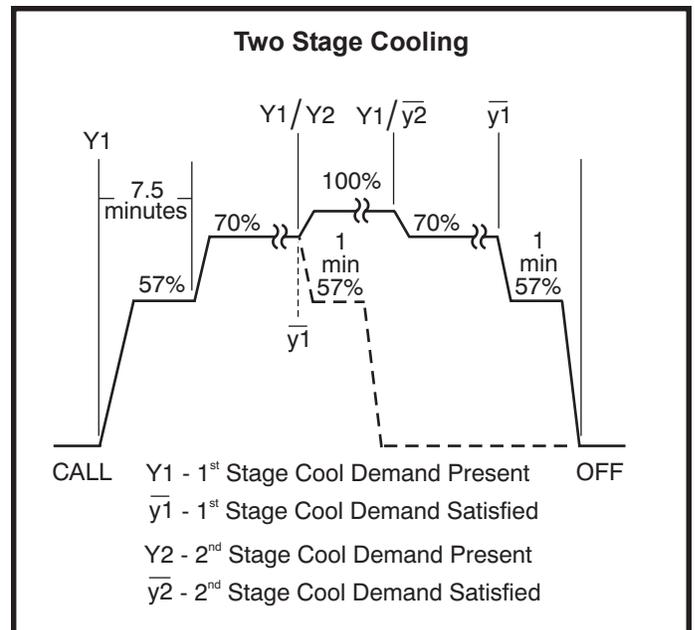


Figure 37

Controls

Following is a description of the operation of some of the controls used in this furnace. All models use one of each control, except as noted.

Pressure Switch

The pressure switch is a normally open switch that monitors combustion air flow. Inadequate air flow resulting from excessive venting system restriction or a failed combustion blower will cause the switch to remain open. A80UH2V and 80G2UHV models have two pressure switches.

Rollout Switch

The rollout switch is a normally closed switch that opens when abnormal temperatures exist in the burner area. This can be caused by a restricted heat exchanger causing burner flame to "roll out" into the vestibule area or burner box.

This switch must be manually reset by pushing the button on top to restore furnace operation. A80UH2V and 80G2UHV models have two rollout switches.

Primary Limit Control

This is a normally closed control that opens if abnormally high circulating air temperatures occur. It is an automatic reset control.

Auxiliary Limit Control

This is a normally closed control, located on the circulating air blower housing, that opens under abnormal "reverse air flow" conditions that could occur in a counterflow or horizontal installation if the circulating air blower fails. It is an automatic reset control.

Interlock (Blower Door) Switch

When the blower door is removed, the interlock switch breaks the power supply to the burner controls and blower motor. The switch operation must be checked to confirm it is operating correctly.

Checking and Adjusting Gas Input

The minimum permissible gas supply pressure for the purpose of input adjustment is 5" w.c. for natural gas or 11" w.c. for propane gas. This furnace requires conversion for use with propane (see Accessories section on page 26 for correct kit). The maximum inlet gas supply pressure is 10.5" w.c. for natural gas and 13" w.c. for propane. Gas input must never exceed the value shown on the furnace rating plate.

These units are equipped for rated input at manifold pressures of 1.7" w.c. (1st stage) and 3.5" w.c. (2nd stage) for natural gas. When these furnaces have been converted for use with

propane gas, the manifold pressures are 4.9" w.c. (1st stage) and 10.0" w.c. (2nd stage).

To measure inlet or outlet pressure, remove plug from desired pressure tap (inlet or outlet) as shown in Figure 38 and connect a water manometer or gauge to the proper pressure tap.

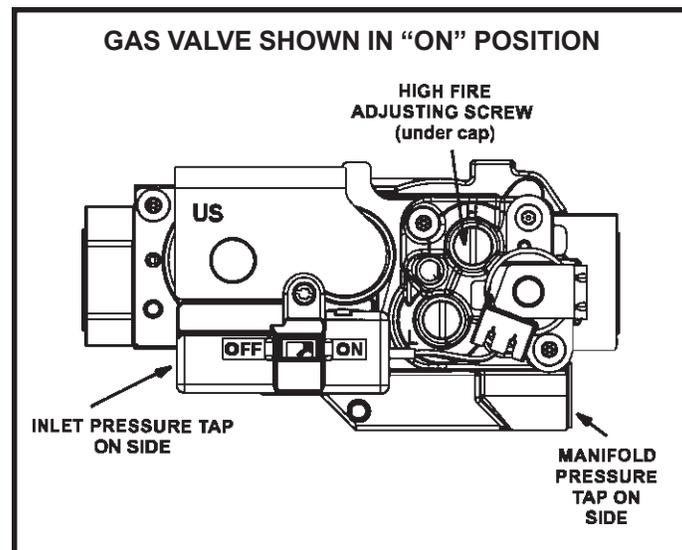


Figure 38

These models have separate adjusting screws (3/32" hex) for 1st stage (marked "LO") and 2nd stage (marked "HI"). The adjusting screws are positioned on either side of the barbed fitting (see Figure 38). Turn the adjusting screws clockwise to increase pressure and input; counterclockwise to decrease pressure and input. The pressure regulator adjustment is sensitive; one turn of the adjusting screw will result in a relatively large change in manifold pressure.

To adjust the regulator:

1. Set high-fire (2nd stage) setting by turning hex adjustment screw to desired rate.
2. Set low-fire (1st stage) setting by turning hex adjustment screw to desired rate.

Make sure the final high and low fire manifold pressures are within the allowable ranges specified above for the gas being used.



The furnace rate must be within +/- 2% of the appliance rating input.

Be sure to replace the inlet and outlet pressure tap plugs after testing and/or adjusting gas input.

For Natural Gas: Check the furnace rate by observing the gas meter, when available, making sure all other gas appliances are turned off. The test hand on the meter should be timed for at least one revolution. Note the number of seconds for one revolution.

$$\text{BTU/HR INPUT} = \frac{\text{Cubic Feet Per Revolution}}{\text{\# Seconds Per Revolution}} \times 3600 \times \text{Heating Value}$$

The heating value of the gas can be obtained from the local utility company.

For Propane Gas: The only check for the furnace rate is to properly adjust the manifold pressure using a manometer and the information provided in Table 12. Typical manifold set point for installations at altitudes from 0 to 4500 feet above sea level is 10.0" W.C.

Temperature Rise

Check the temperature rise and, if necessary, adjust blower speed to maintain temperature rise within the range shown on the unit rating plate.

High Altitude

In both the United States and Canada, this furnace is approved for operation at altitudes from 0 to 4500 feet above sea level without any required modifications. From 4500 to 7500 feet, the gas manifold pressure needs to be adjusted

according to the information shown in Table 12. To adjust the manifold pressure, refer to previous section **Checking and Adjusting Gas Input**. For installations above 7500 feet, call Technical Service at 1-800-515-3501 for assistance.

For installations above 4500 feet fill in the appropriate information on the furnace label that has the words **“This furnace was converted on”**.

Emergency Replacement Motor Operation

If the variable speed motor needs to be replaced in an emergency situation (such as “no heat”) and an exact replacement motor is not immediately available, a standard PSC motor of equivalent frame size, voltage, rotation, and horsepower can be **temporarily** installed until the correct replacement motor can be obtained.

Connect the desired speed tap to the “EAC” terminal and the neutral tap to the neutral terminal on the ignition control (refer to the furnace wiring diagram). The ignition control will control the motor’s operation, including a nominal 20 second “on” delay with a call for heat and a nominal 180 second “off” delay when the thermostat is satisfied. It will also operate the motor on a call for cooling, with no “on” or “off” delays.

Verify that the unit is operating at the desired speed and within the rise range as shown on the unit rating plate.

The correct replacement motor must be installed as soon as possible to ensure continued satisfactory operation of the furnace.

MANIFOLD PRESSURE SETTINGS											
Unit Input	Gas	Orifice Size 0 - 7500 ft	Orifice Size 7501 - 10,000 ft	Manifold Pressure in. w.c. 0 - 4500 ft		Manifold Pressure in. w.c. 4501 - 7500 ft		Manifold Pressure in. w.c. 7501 - 10,000 ft		Supply Line Pressure in. w.c.	
				Low Fire	High Fire	Low Fire	High Fire	Low Fire	High Fire	Min	Max
070	Natural	.063	.055	1.7	3.5	1.6	3.4	1.7	3.5	4.5	13.0
	LP/propane	.039	.037	4.9	10.0	4.9	10.0	4.9	10.0	11.0	13.0
090	Natural	.063	.055	1.7	3.5	1.5	3.2	1.7	3.5	4.5	13.0
	LP/propane	.039	.037	4.9	10.0	4.9	10.0	4.9	10.0	11.0	13.0
110	Natural	.063	.055	1.7	3.5	1.5	3.2	1.7	3.5	4.5	13.0
	LP/propane	.039	.037	4.9	10.0	4.9	10.0	4.9	10.0	11.0	13.0
135	Natural	.063	.055	1.7	3.5	1.6	2.8	1.7	3.5	4.5	13.0
	LP/propane	.039	.037	4.9	10.0	4.9	10.0	4.9	10.0	11.0	13.0

* Consult local utility for actual heating value.
 Furnace input = Input Factor x Nameplate Input
NOTE: A natural to LP/Propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.

Table 12

MAINTENANCE



ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD

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

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

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

It is recommended that this furnace be inspected by a qualified service technician at the beginning of each heating season.

Filters

Filters should be checked at least every 6 weeks. Disposable filters should be replaced when dirty, and cleanable filters should be cleaned regularly. It is important to keep the air filters clean, as dirty filters can restrict airflow and the blower and induced draft motors depend upon sufficient air flowing across and through them to keep from overheating.

Burners

Light the burners and allow to operate for a few minutes to establish normal burning conditions. Observe the burner flames. Compare this observation to Figure 39 to determine if proper flame adjustment is present. Flame should be predominantly blue in color and strong in appearance. Check that all burners are lit, and that the flame does not impinge on the sides of the heat exchanger.

Distorted flame or yellow tipping of the natural gas burner flame, or long yellow tips on propane, may be caused by lint accumulation or dirt inside the burner or burner ports, at the air inlet between the burner and manifold pipe, or obstructions over the burner orifice.

Use a soft brush or vacuum to clean the affected areas.

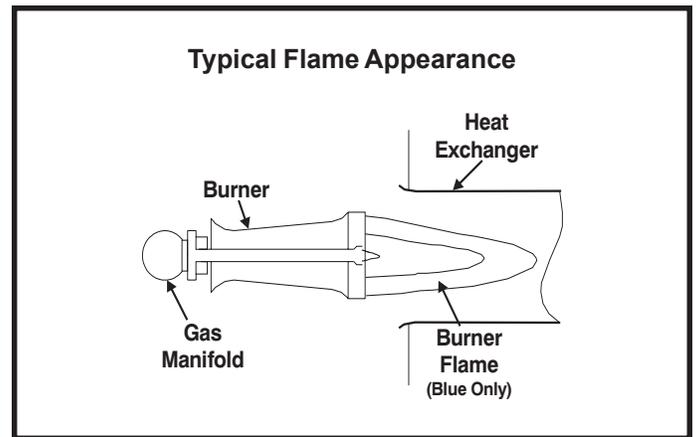


Figure 39

Lubrication

The blower motor and induced draft motor are pre-lubricated by the manufacturer and do not require further lubricating attention. However, the motors should be cleaned periodically to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior.

CONTROL DIAGNOSTICS

Troubleshooting

Make the following visual checks before troubleshooting:

1. Check to see that the power to the furnace and the integrated ignition/blower control board is ON.
2. The manual shutoff valves in the gas line to the furnace must be open.
3. Make sure all wiring connections are secure.
4. Review the Sequence of Operation (see page 31).

Start the system by setting thermostat above room temperature. Observe system response. Then use the information provided in this section to check the system operation.

The furnace has a built-in, self-diagnostic capability. If a system problem occurs, a fault code is shown by a red LED on the control board. The control continuously monitors its own operation and the operation of the system. If a failure occurs, the LED will indicate the failure code. The flash codes are presented in Table 13

Fault Code History Button

The control stores the last five fault codes in memory. A pushbutton switch is located on the control (see Figure 40 on page 38). When the pushbutton switch is pressed and released, the control flashes the stored fault codes. The most recent fault code is flashed first; the oldest fault code is flashed last. To clear the fault code history, press and hold the pushbutton switch in for more than 5 seconds before releasing.

High Heat State LED

On A80UH2V and 80G1UH2V models, a green LED is provided on the control board to indicate high heat state (see Table 14).

CFM LED

On A80UH2V and 80G1UH2V models equipped with a variable speed motor, an amber LED is provided on the control board to display CFM. To determine what CFM the motor is delivering at any time, count the number of times the amber LED flashes. Each flash signifies 100 CFM; count the flashes and multiply by 100 to determine the actual CFM delivered (for example: 10 flashes x 100 = 1000 CFM).

Failure Codes - Red LED

LED Status	Fault Description
LED Off	No power to control or control hardware fault detected
LED On	Normal operation
1 Flash	Flame Present with gas valve off
2 Flashes	Pressure switch closed with inducer off
3 Flashes	Low-fire pressure, rollout, or aux limit switch open
4 Flashes	High limit switch open
5 Flashes	Not used
6 Flashes	Pressure switch cycle lockout
7 Flashes	Lockout due to no ignition
8 Flashes	Lockout due to too many flame dropouts
9 Flashes	Incorrect polarity and phasing

Table 13

High Heat State - Green LED

LED Status	Description
LED Off	No demand for high heat
LED On	High heat demand, operating normally
LED Flashing	High heat demand, high pressure switch not closed

Table 14

REPAIR PARTS

The following repair parts are available from the local distributor. When ordering parts, include the complete furnace model number and serial number which are printed on the rating plate located on the furnace.

Control Group

Transformer
High limit control
Auxiliary limit
Gas valve
Integrated ignition/blower control board
Flame sensor
Pressure switches – 1st stage and 2nd stage
Blower door interlock switch
Combustion blower assembly
Flame rollout protector switch
Hot surface igniter
Input choke

Heat Exchanger Group

Heat exchanger

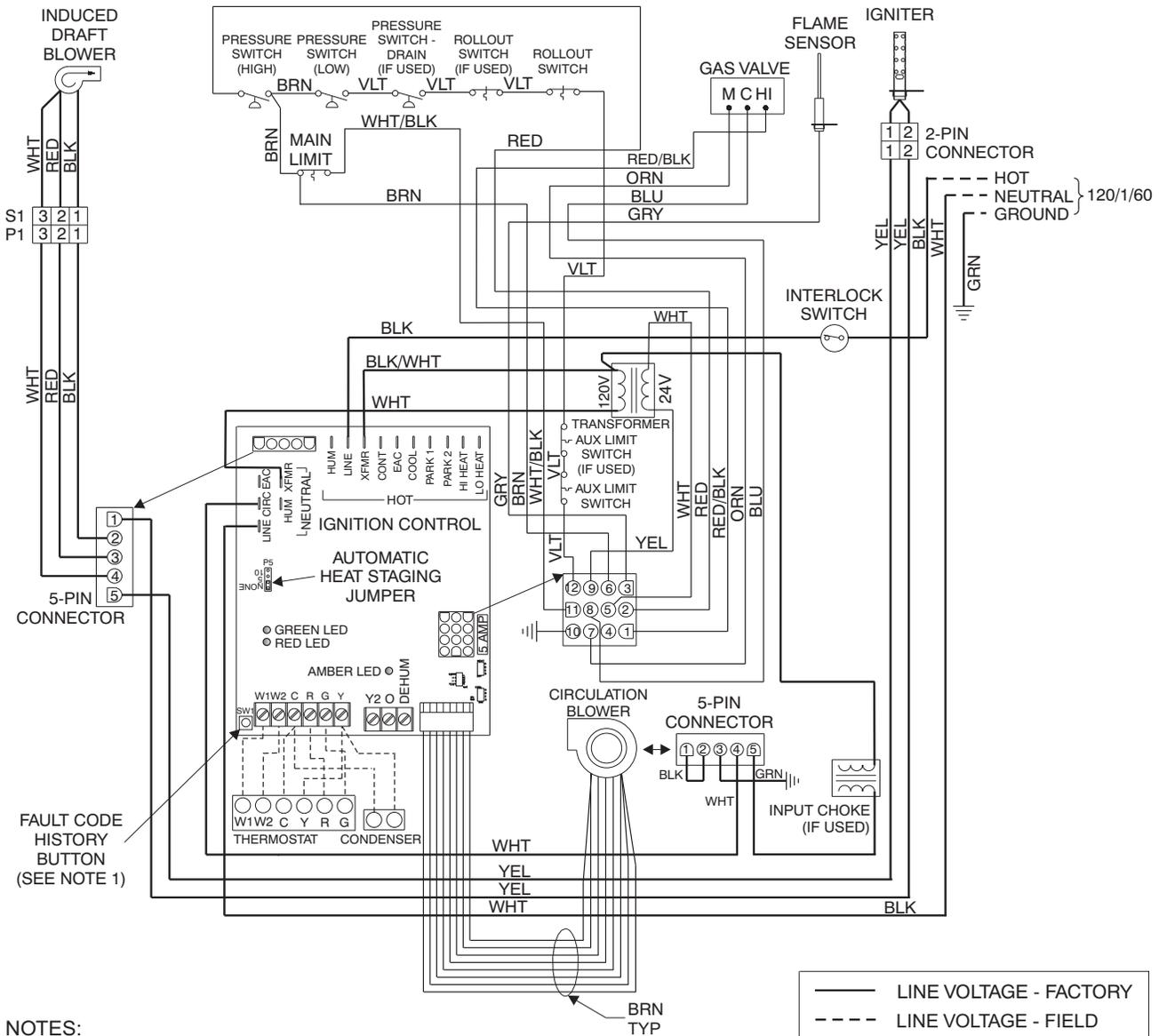
Blower Group

Blower housing assembly
Blower wheel
Blower mount
Blower motor
Blower motor mount

Burner Group

Gas manifold
Burner orifices
Burners

Wiring Diagram



NOTES:

1. PRESS AND RELEASE FAULT CODE HISTORY BUTTON TO DISPLAY FAULT CODES. TO ERASE CODES, PRESS AND HOLD BUTTON IN FOR MORE THAN 5 SECONDS
2. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE FURNACE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMP. RATING OF AT LEAST 90°C.
3. PROPER POLARITY MUST BE OBSERVED FOR FIELD LINE VOLTAGE SUPPLY; IGNITION CONTROL WILL LOCK OUT IF POLARITY IS REVERSED.
4. FOR TEMPORARY SERVICE REPLACEMENT OF CIRCULATING BLOWER MOTOR WITH PSC MOTOR, CONNECT DESIRED SPEED TAP TO "EAC" TERMINAL AND NEUTRAL TAP TO NEUTRAL TERMINAL ON IGNITION CONTROL.
5. DO NOT CONNECT C (COMMON) CONNECTION BETWEEN INDOOR UNIT AND THERMOSTAT EXCEPT WHEN REQUIRED BY THE INDOOR THERMOSTAT. REFER TO THE THERMOSTAT INSTALLATION INSTRUCTIONS.

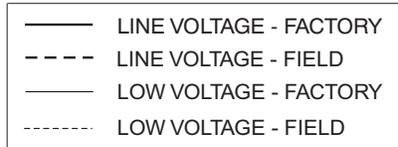


Figure 40

Typical Field Wiring Diagram

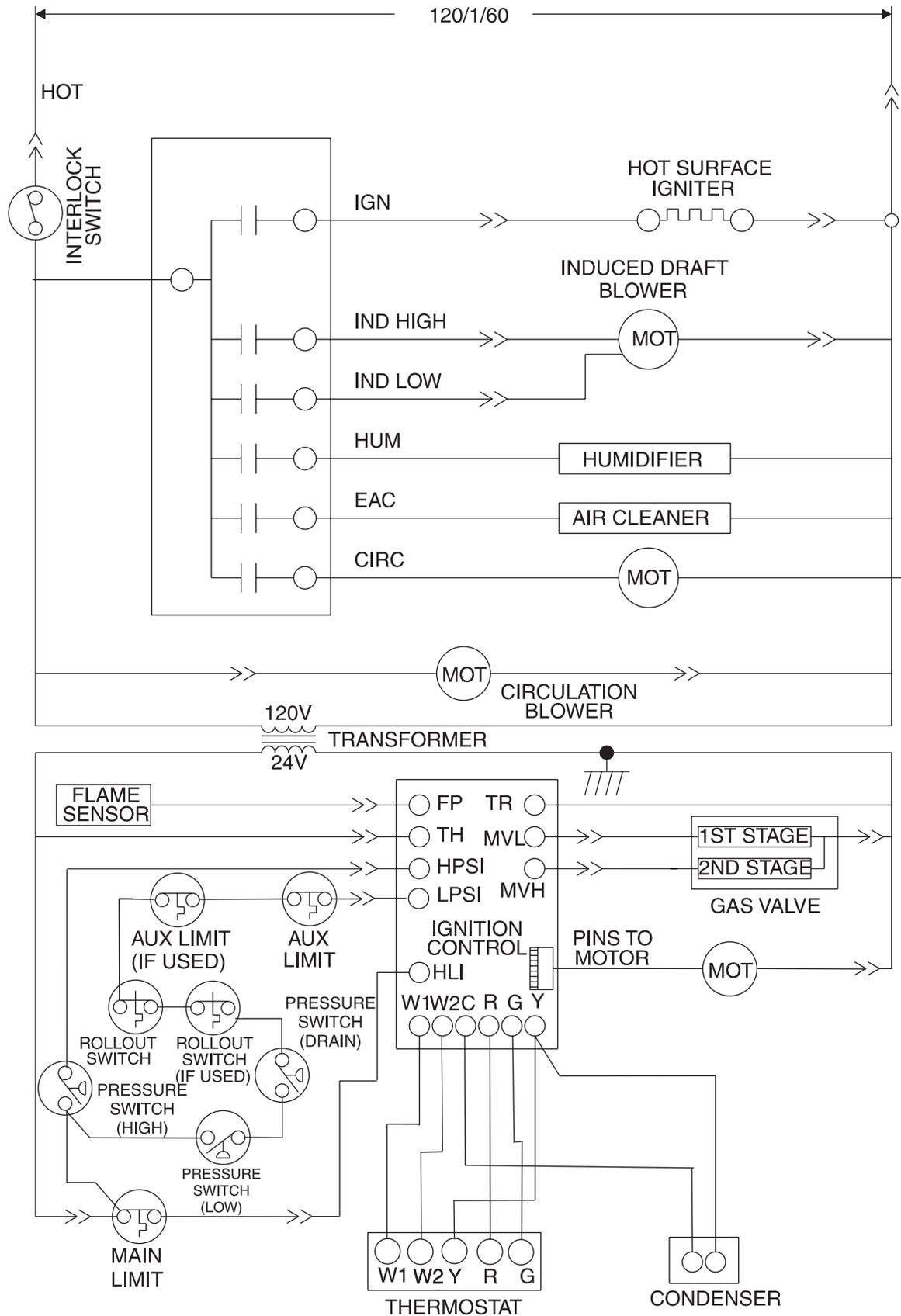


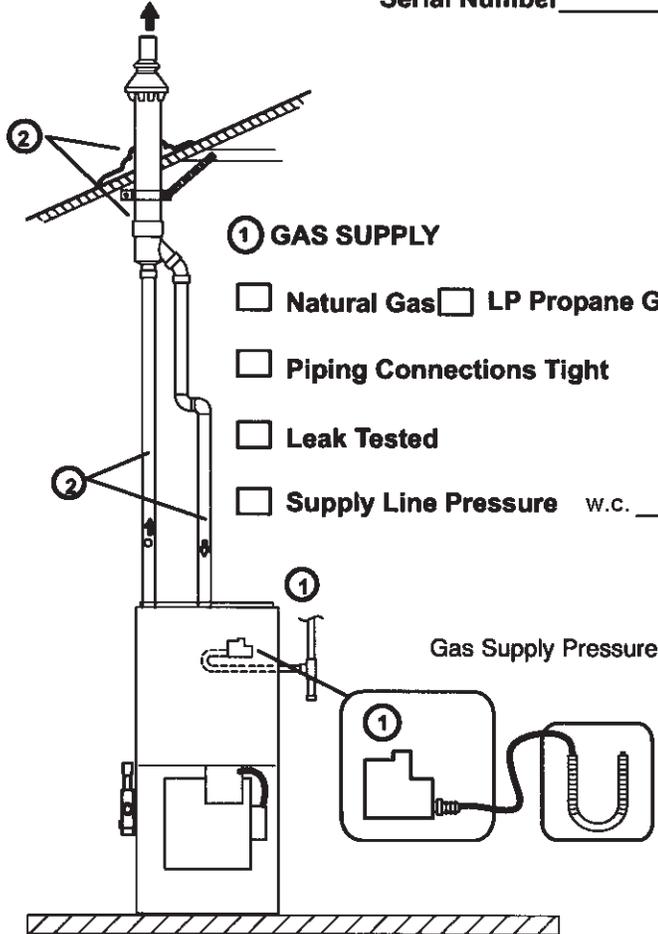
Figure 41

START-UP & PERFORMANCE CHECK LIST

UNIT SET UP

Furnace:
Model Number _____

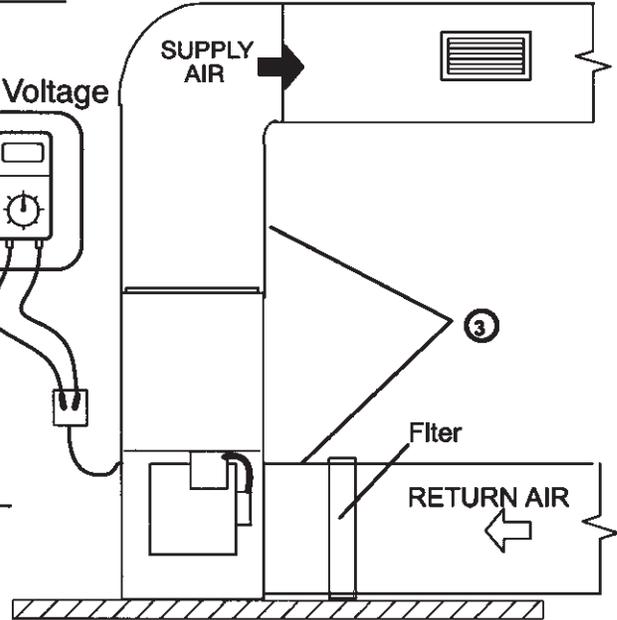
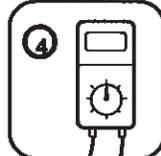
Serial Number _____



① GAS SUPPLY

- Natural Gas LP Propane Gas
- Piping Connections Tight
- Leak Tested
- Supply Line Pressure w.c. _____

Line Voltage



③ DUCT SYSTEM

SUPPLY AIR DUCT

- Sealed
- Insulated (if necessary)

RETURN DUCT

- Sealed
- Filter Installed and Clean
- Grilles Unobstructed

④ VOLTAGE CHECK

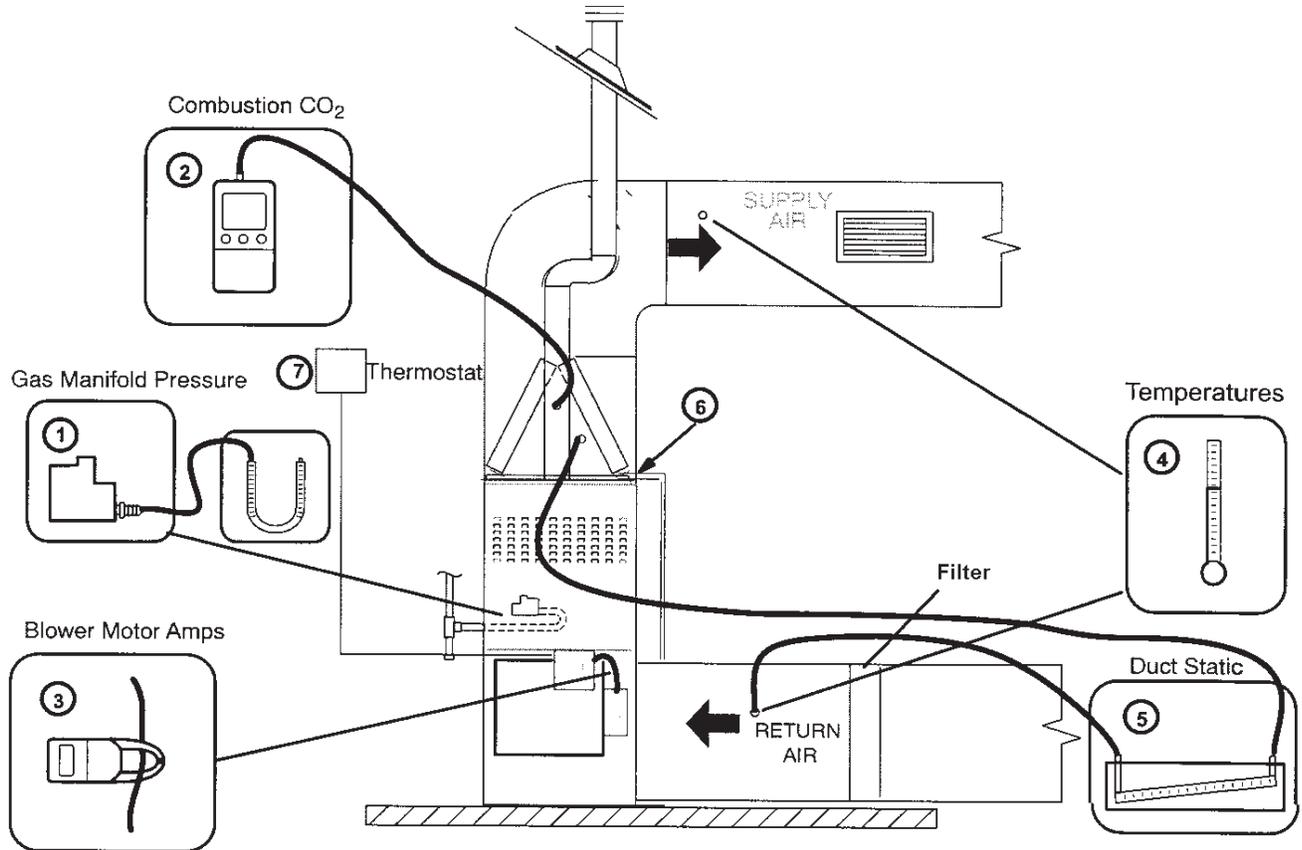
Supply Voltage _____

- Electrical Connections Tight

② INTAKE / EXHAUST PIPE

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

UNIT OPERATION



HEATING MODE

- ① GAS MANIFOLD PRESSURE "W.C." _____
- ② COMBUSTION SAMPLE CO₂% _____ CO PPM _____
- ③ INDOOR BLOWER AMPS _____
- ④ TEMPERATURE RISE
 Supply Duct Temperature _____
 Return Duct Temperature - _____
 Temperature Rise = _____
- ⑤ TOTAL EXTERNAL STATIC (dry coil)
 Supply External Static _____
 Return External Static + _____
 Total External Static = _____

COOLING MODE

- ③ INDOOR BLOWER AMPS _____
- ④ TEMPERATURE DROP
 Return Duct Temperature _____
 Supply Duct Temperature - _____
 Temperature Drop = _____
- ⑤ TOTAL EXTERNAL STATIC (dry coil)
 Supply External Static _____
 Return External Static + _____
 Total External Static = _____
- ⑥ DRAIN LINE
 Leak Free
- ⑦ THERMOSTAT
 Adjusted and Programmed
 Operation Explained to Owner

Contractor's Name _____ Telephone _____ Checklist Completed _____

Job Address _____ Technician's Name _____

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