



GE APPLIANCES



INSTALLATION INSTRUCTIONS

NF80U***V**R

Warm Air Gas Furnace
Upflow/Horizontal
Two Stage Variable Speed
Left/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.

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.

WARNING

This furnace is equipped with an ignition control factory enabled for use with GE Appliances A2L refrigerant systems. Disabling the refrigerant detection functionality on A2L system is prohibited by safety codes. Refer to furnace installation instructions for non-A2L and non-GE Appliances refrigerant system setup.

Contact GE Appliances at:
Homeowner: www.geappliances.com
HVAC Pro: www.geappliancesairandwater.com or
866-814-3633

Split System USAC and USHP matches:
www.AHRIDirectory.org

GE Appliances
A Haier Company
Appliance Park
Louisville, KY 40225

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WARNING

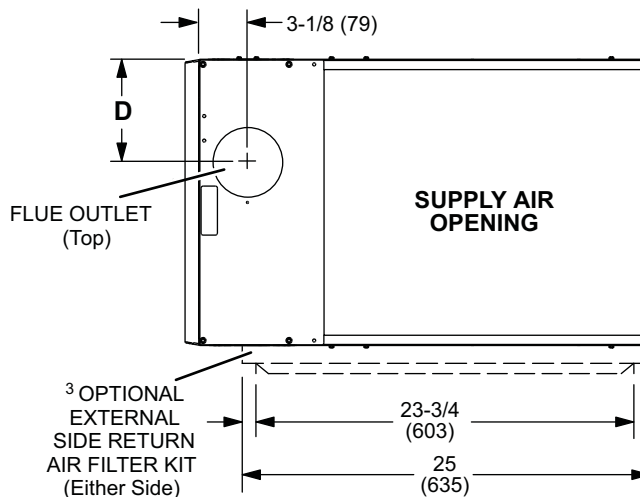
As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.



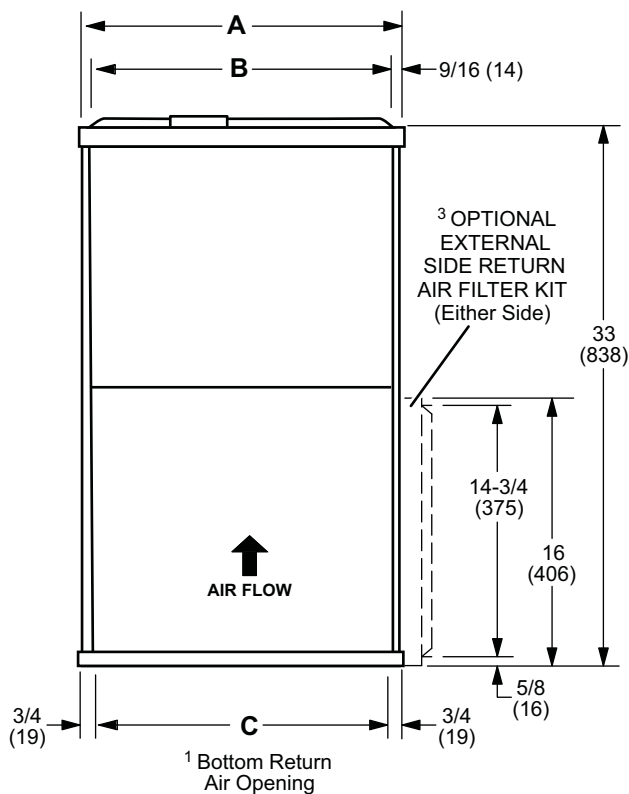
(P) 508524-01G

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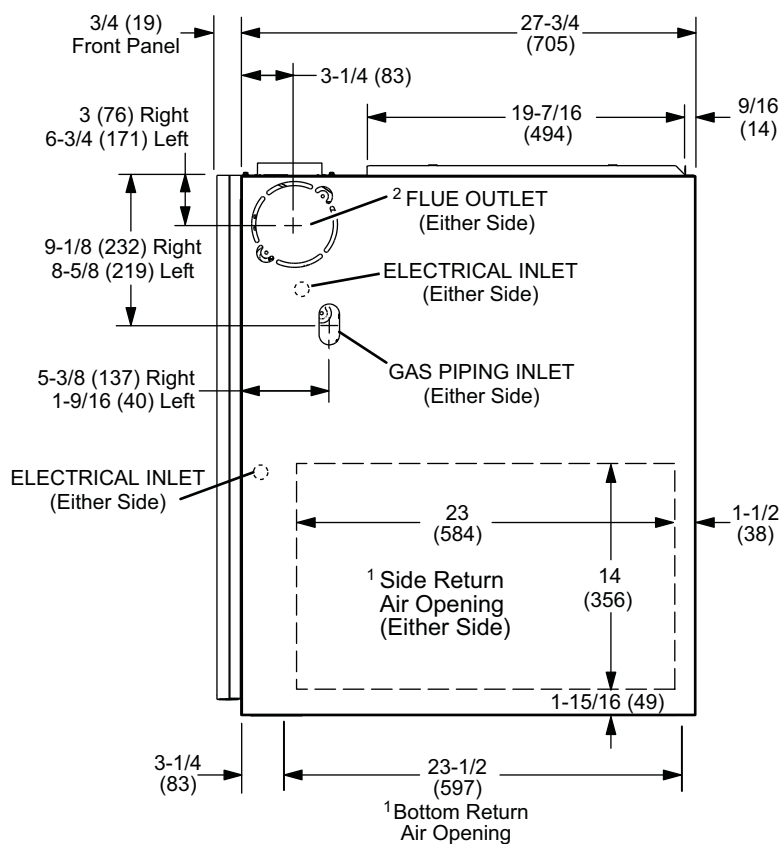
Unit Dimensions



TOP VIEW



FRONT VIEW



SIDE VIEW

Model	Cooling Capacity	A		B		C		D	
		in.	mm	in.	mm	in.	mm	in.	mm
070-3A	3 ton	14-1/2	368	13-3/8	340	13	330	4-3/4	121
090-4B	4 ton	17-1/2	446	16-3/8	416	16	406	6-1/4	159
110-5C	5 ton	21	533	19-7/8	504	19-1/2	495	8	203

Parts Arrangement

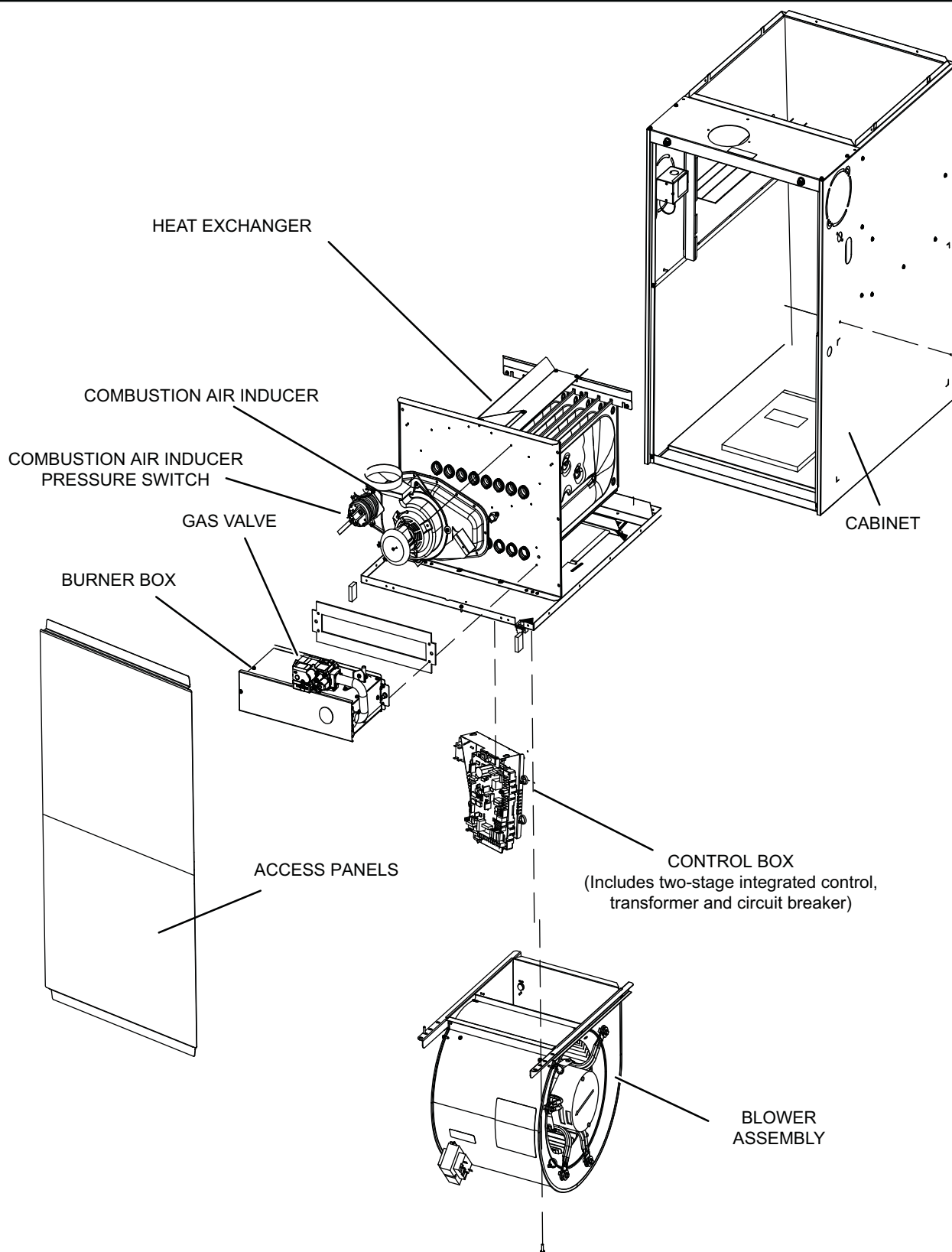


Figure 1.

NF80U***V**R Gas Furnace

The NF80U***V**R gas furnace is shipped ready for installation in the upflow or horizontal position (left or right). 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

RDS Sensor kit can be ordered separately and is field installed.

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.

Certifications

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

In the USA, installation of gas furnaces must conform with local building codes. In the absence of local codes, units must be installed according to the current National Fuel Gas Code (ANSI-Z223.1). The National Fuel Gas Code is

available from the following address: American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.

Clearances

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

This furnace is CSA International certified for installation clearances to combustible material as listed on the unit nameplate and in the tables in Figure 8 and Figure 11. Installers should also consider the greater of either accessibility/service clearances or 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 (high and low fire) within the range(s) 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.

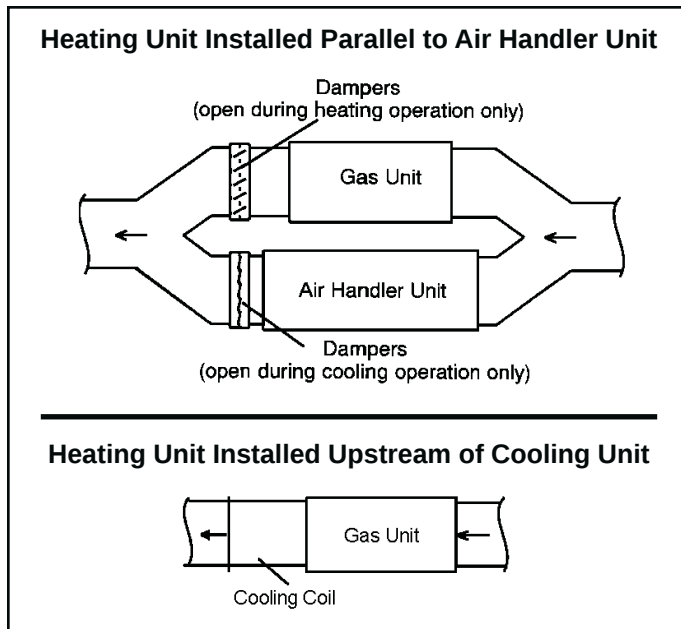


Figure 2.

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

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

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

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.
- The refrigerant leak detection sensor must be inspected for dust/debris deposits. Please refer to the evaporator coil and/or refrigerant detection sensor kit instructions for additional information.
- All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

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

NOT WITH STANDING THE FOREGOING, INSTALLER IS RESPONSIBLE FOR CONFIRMING THAT THE USE OF CONSTRUCTION HEAT IS CONSISTENT WITH THE POLICIES AND CODES OF ALL REGULATING ENTITIES. ALL SUCH POLICIES AND CODES MUST BE ADHERED TO.

General

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

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

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

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

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

CAUTION

These units should not be installed in areas normally subject to freezing temperatures.

Combustion, Dilution & Ventilation Air

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

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

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

All gas fired appliances require air for the combustion process. If sufficient combustion air is not available, the furnace or other appliances will operate inefficiently and unsafely. Enough air must be provided to meet the

needs of all fuel burning appliances and appliances such as exhaust fans which force air out of the house. When fireplaces, exhaust fans, or clothes dryers are used at the same time as the furnace, much more air is necessary to ensure proper combustion and to prevent a downdraft. Insufficient air causes incomplete combustion which can result in carbon monoxide.

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.

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
- Cements and glues
- Anti static fabric softeners for clothes dryers
- Masonry acid washing materials

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.

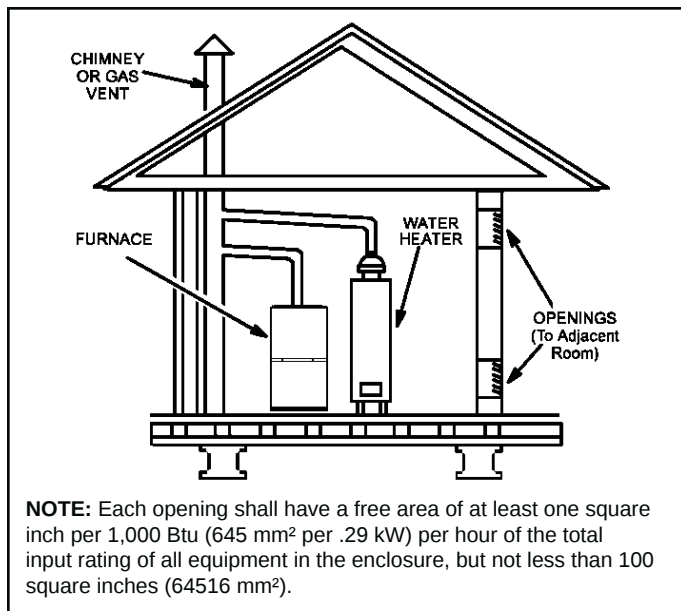


Figure 3. Equipment in Confined Space - All Air From Inside

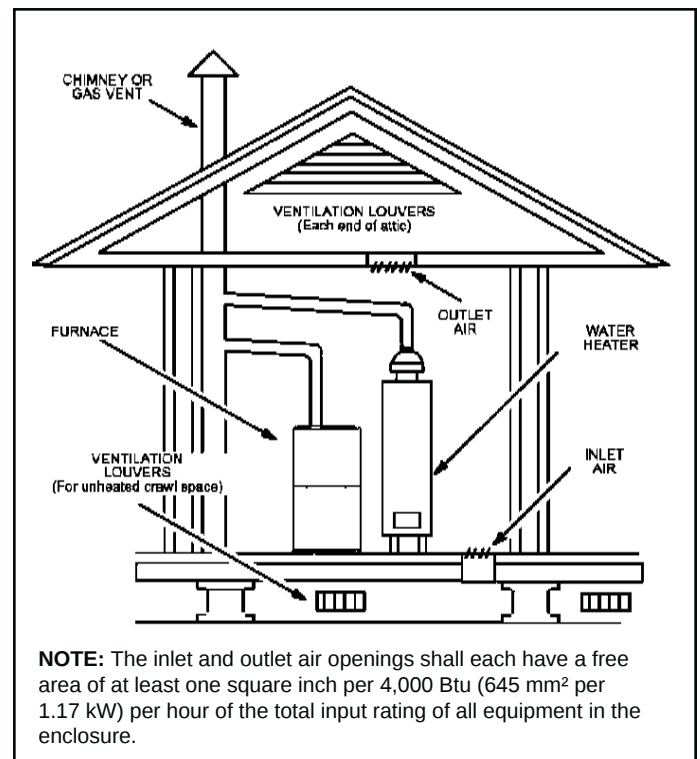
Air from Inside

If the confined space that houses the furnace adjoins a space categorized as unconfined, air can be brought in by providing two permanent openings between the two spaces. Each opening must have a minimum free area of 1 square inch (645 mm²) per 1,000 Btu (.29 kW) per hour of total input rating of all gas fired equipment in the confined space. Each opening must be at least 100 square inches (64516 mm²). One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. See Figure 3.

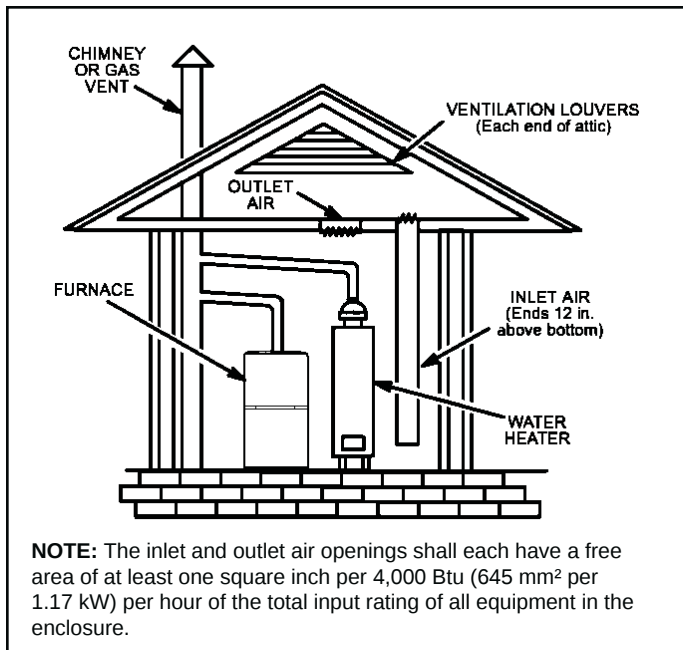
Air from Outside

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 Figure 4 and Figure 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. Equipment in Confined Space - All Air from Outside
(Inlet Air from Crawlspace & Outlet Air to Ventilated Attic)**



**Figure 5. Equipment in Confined Space - All Air from Outside
(All Air through Ventilated Attic)**

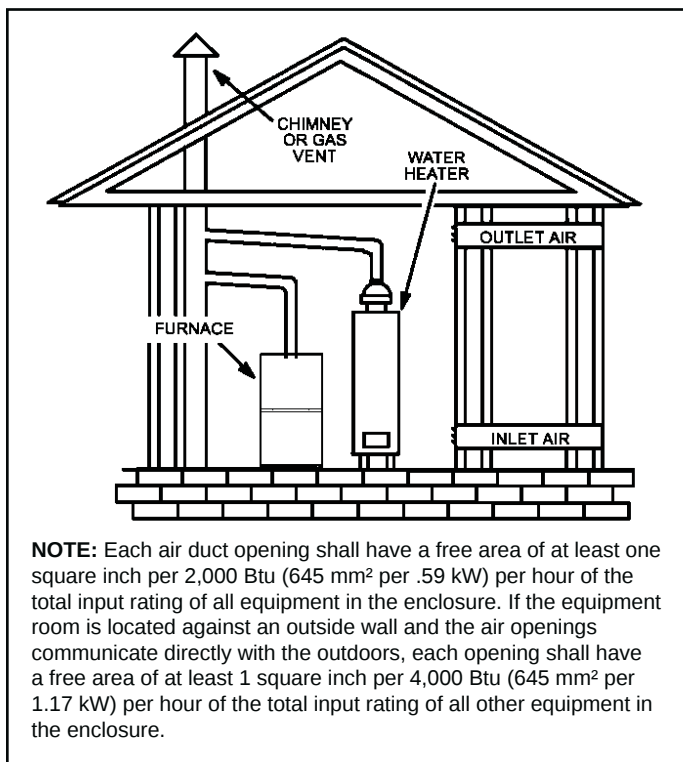


Figure 6. Equipment in Confined Space - All Air from Outside

Setting Equipment

WARNING

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

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

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

NOTE: Units with 1/2 hp 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.

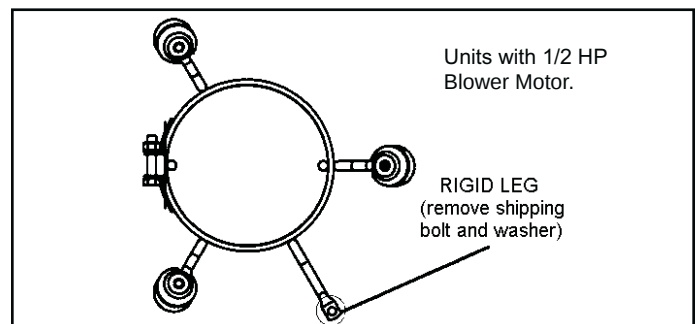


Figure 7.

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.

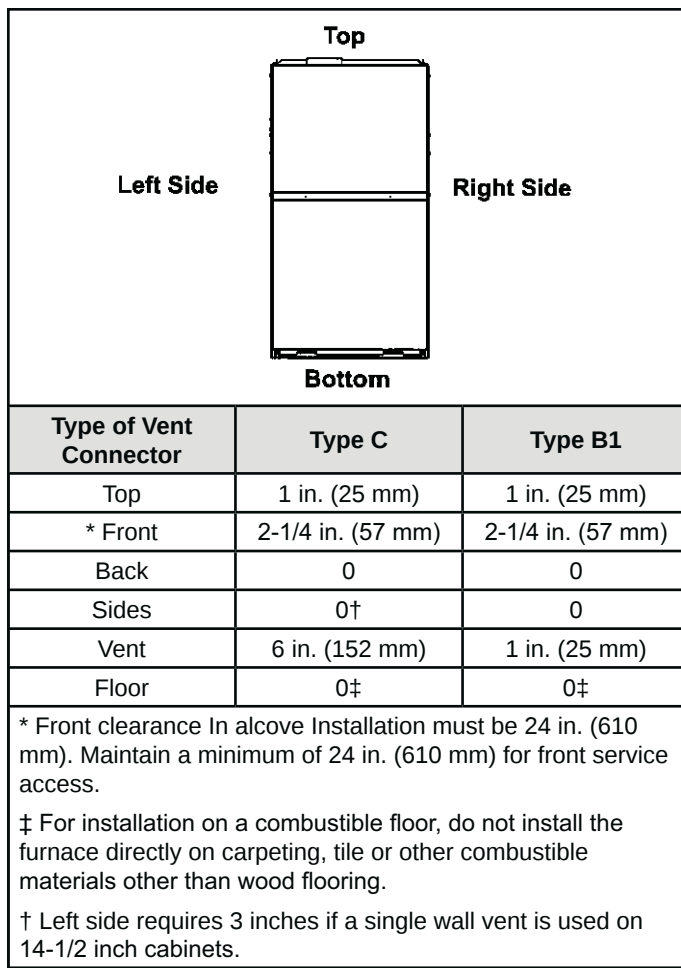


Figure 8. Upflow Application Installation Clearances

Return Air - Upflow Applications

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

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

NOTE: 100-5C 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 12.
3. Bottom return air.
4. Return air from both sides.
5. Bottom and one side return air.

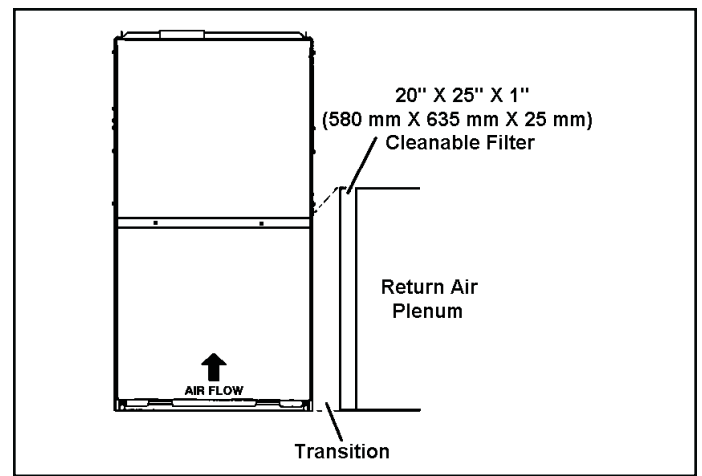


Figure 9. Single Side Return Air (with transition and filter)

Removing the Bottom Panel

Remove the two screws that secure the bottom cap to the furnace. Pivot the bottom cap down to release the bottom panel. Once the bottom panel has been removed, reinstall the bottom cap. See Figure 10.

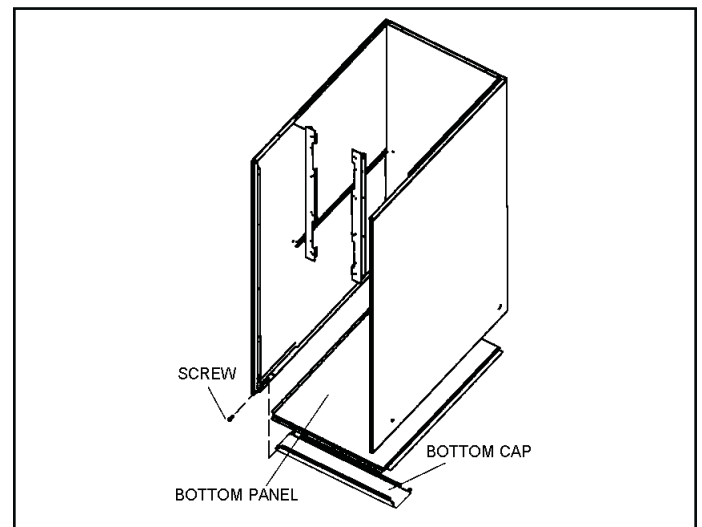


Figure 10. Removing the Bottom Panel

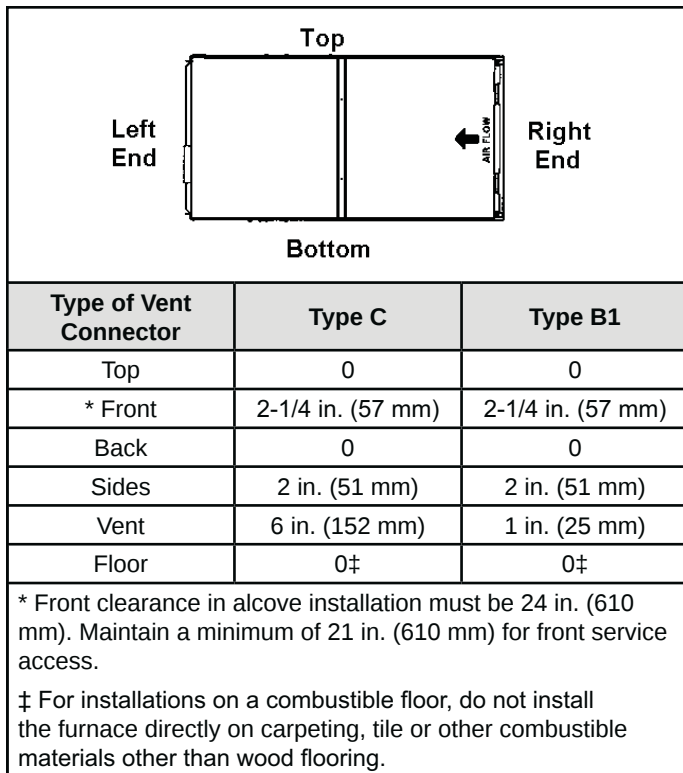


Figure 11. Horizontal Application Installation Clearances

Horizontal Applications

The furnace can be installed in horizontal applications.

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

This furnace may be installed in either an attic or a crawl space. Either suspend the furnace from roof rafters or floor joists, as shown in Figure 13, or install the furnace on a platform, as shown in Figure 14.

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.

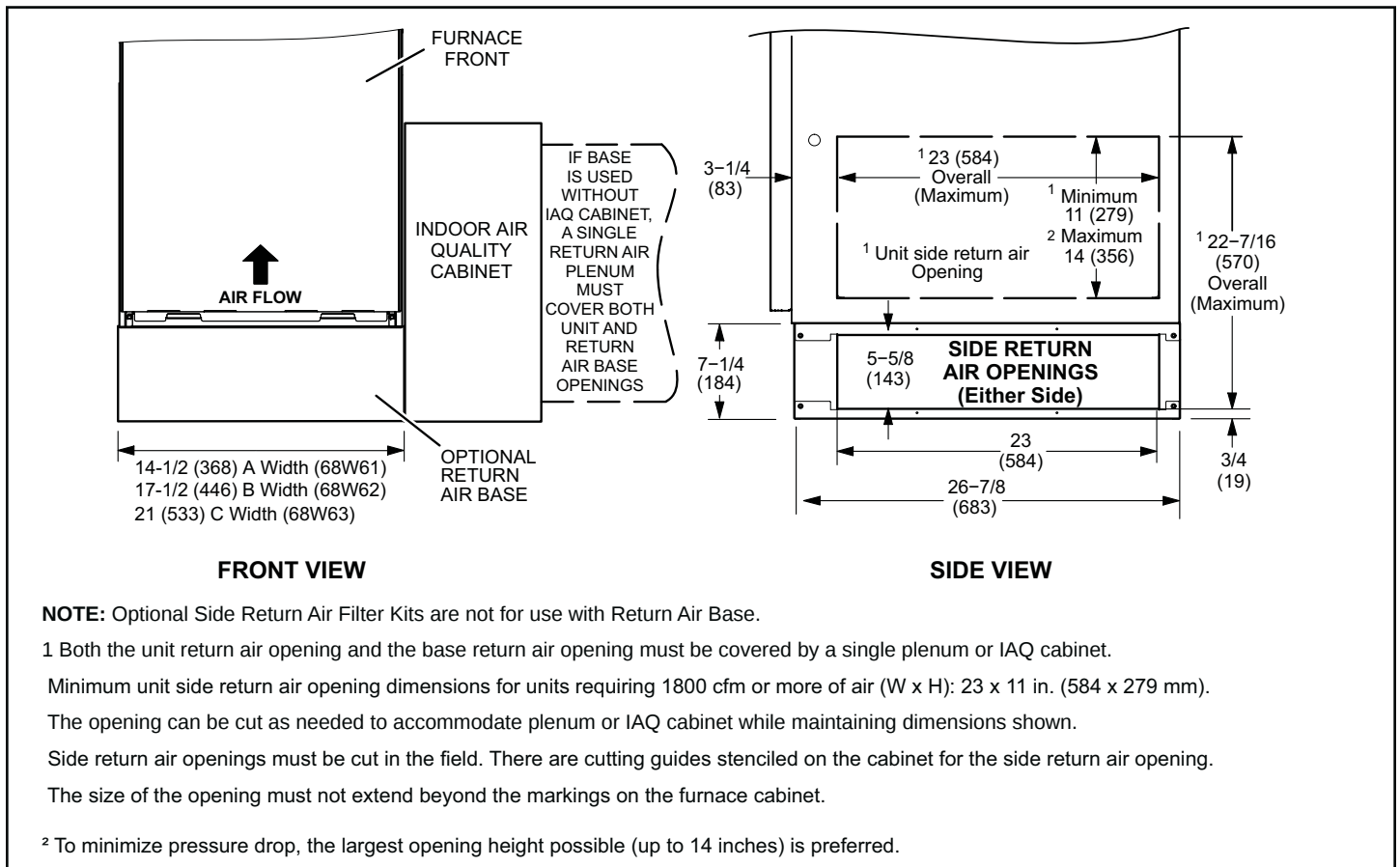
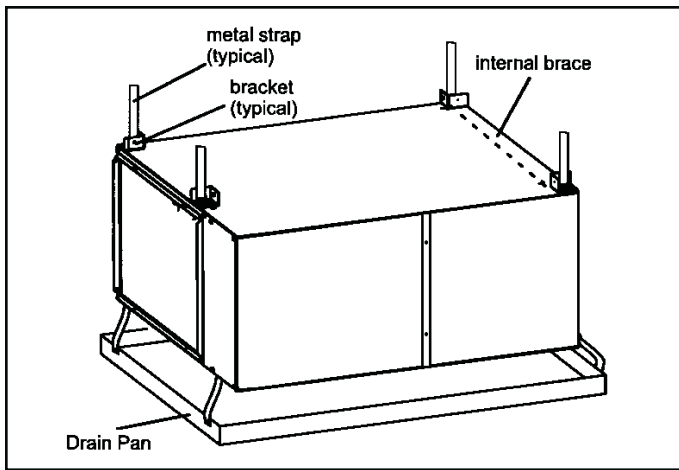


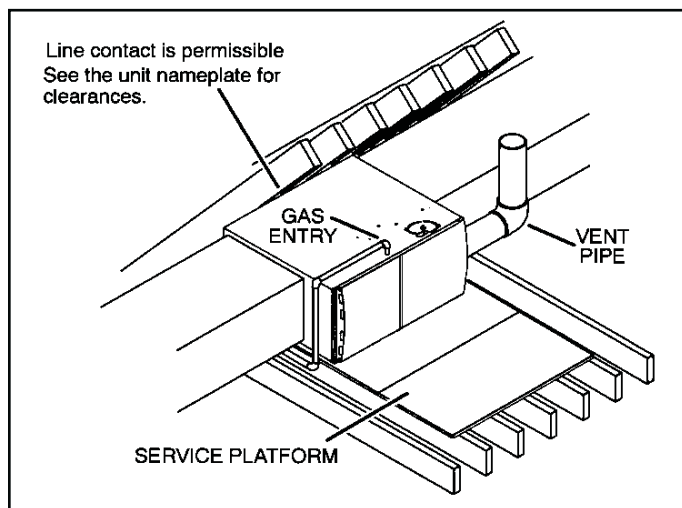
Figure 12. Optional Return Air Base (Upflow Applications Only - For use with A, B, C and D cabinets)



**Figure 13. Horizontal Application
Unit Suspended in Attic or Crawl Space**

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 10.



**Figure 14. Horizontal Application
Unit Installed on Platform**

⚠ 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.

⚠ 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.

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
14-1/2"	16 x 25 x 1 (1)	14 x 25 x 1 (1)
17-1/2"		16 x 25 x 1 (1)
21"		20 x 25 x 1 (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.

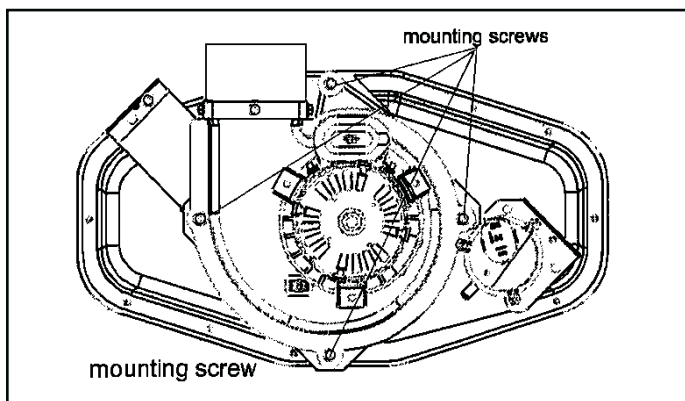


Figure 15. Mounting Screws Location

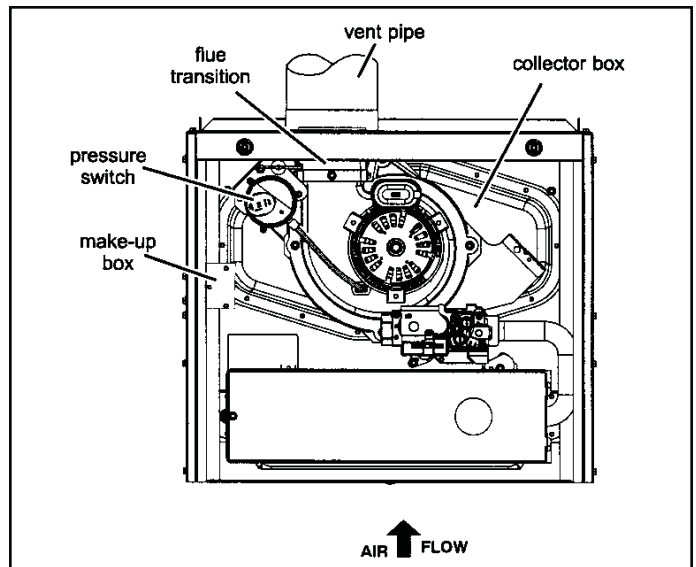


Figure 16. Upflow Position
Top Vent Discharge

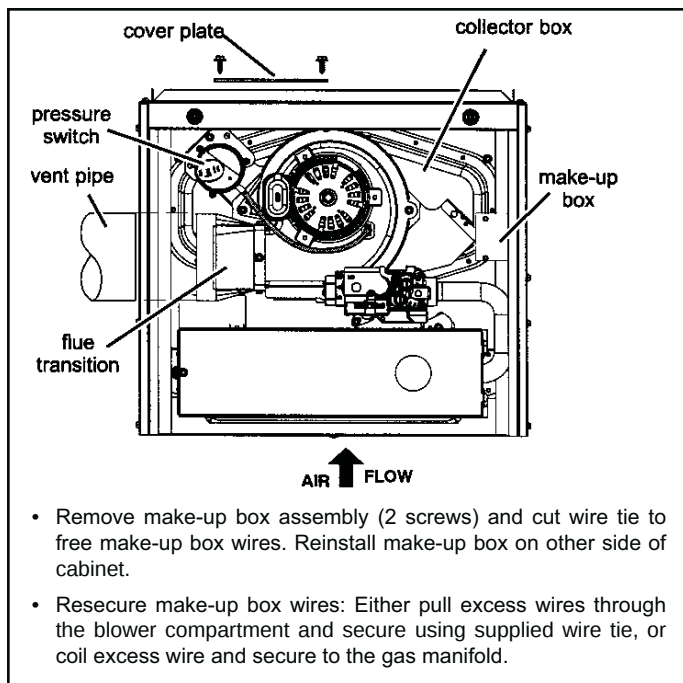
⚠ IMPORTANT

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

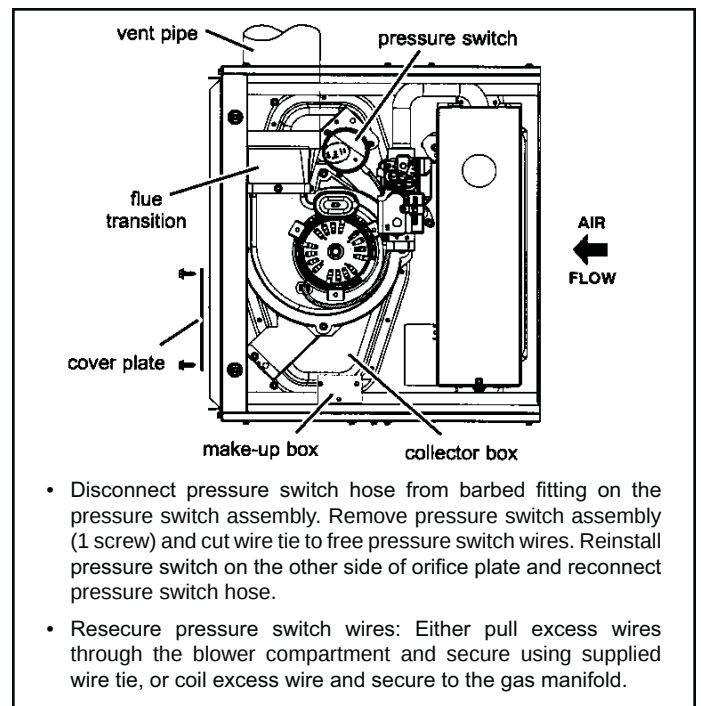
The combustion air inducer may be rotated clockwise or counterclockwise by 90° to allow for top or side vent discharge in all applications. When the unit is installed, the flue transition must be in the 9 o'clock, 12 o'clock or 3 o'clock position.

If necessary reposition the combustion air inducer, pressure switch and/or make-up box as needed per the following steps. See Figure 16 through Figure 22.

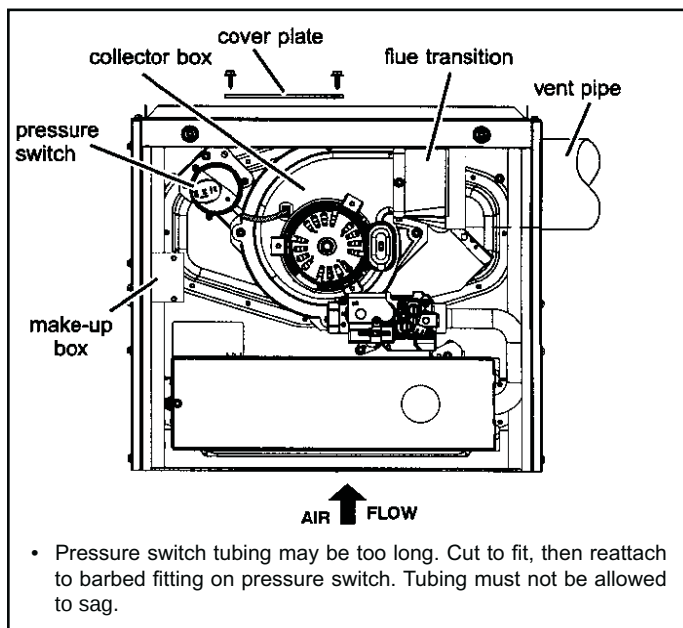
1. Remove the four mounting screws (Figure 15) which secure the combustion air inducer / pressure switch assembly to the orifice plate. Lift the assembly and rotate it 90° clockwise or counter clockwise to either the 3 o'clock position or 9 o'clock position. Resecure with four screws. Gasket should be 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.



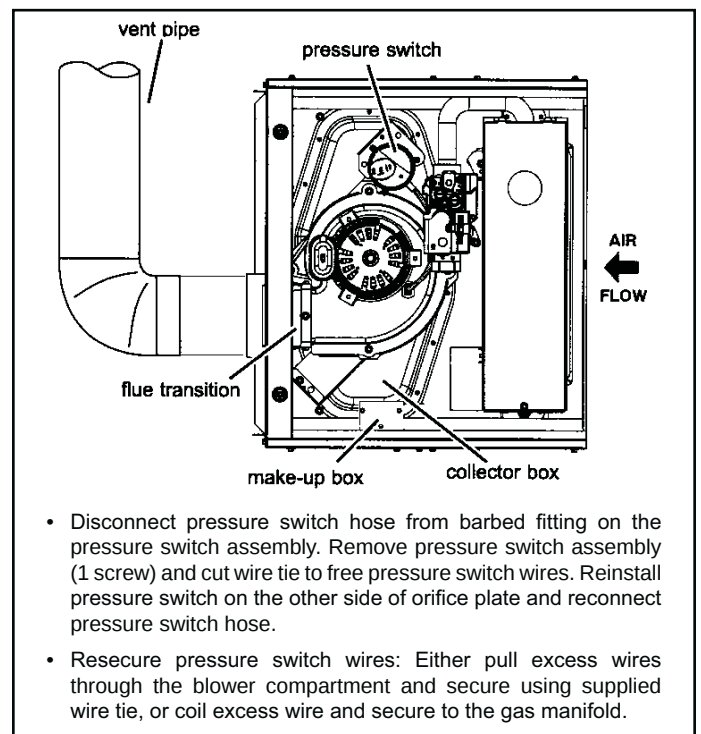
**Figure 17. Upflow Position
Left Side Vent Discharge**



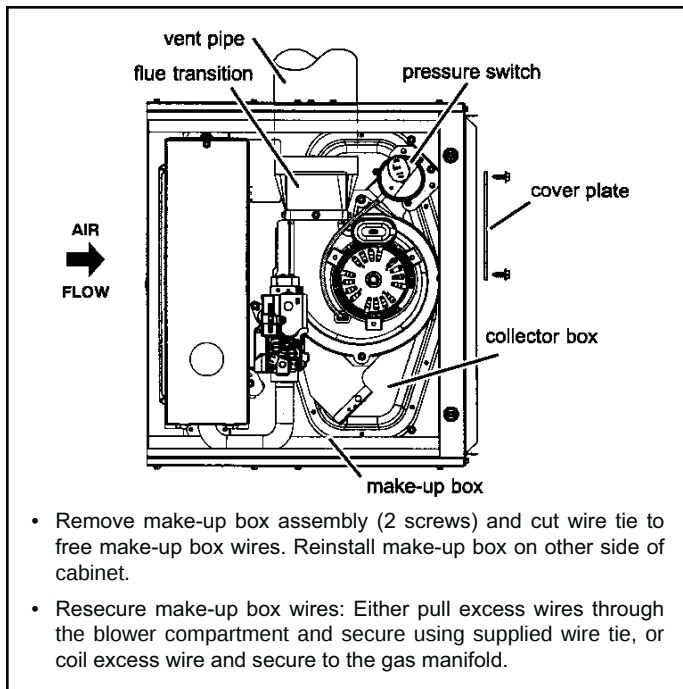
**Figure 19. Horizontal Left Position
Top Vent Discharge**



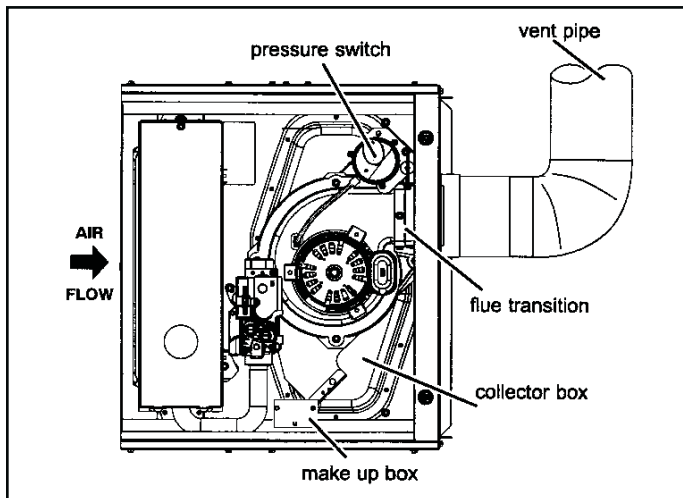
**Figure 18. Upflow Position
Right Side Vent Discharge**



**Figure 20. Horizontal Left Position
Side Vent Discharge**



**Figure 21. Horizontal Right Position
Top Vent Discharge**



**Figure 22. Horizontal Right Position
Side Vent Discharge**

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

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

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

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

⚠ IMPORTANT

Once the venting system is installed, attach the "Disconnected Vent" warning sticker to a visible area of the plenum near the vent pipe. See Figure 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.

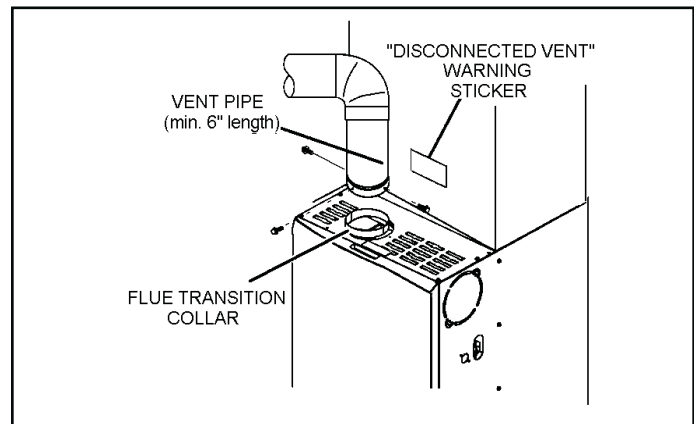


Figure 23. Vent Connection

Use self drilling sheet metal screws or a mechanical fastener to firmly secure the vent pipe to the round collar of the flue transition. If self drilling screws are used to attach the vent pipe, it is recommended that three be used. Drive one self drilling screw through the front and one through each side of the vent pipe and collar. See Figure 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 Figure 24 and Figure 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.

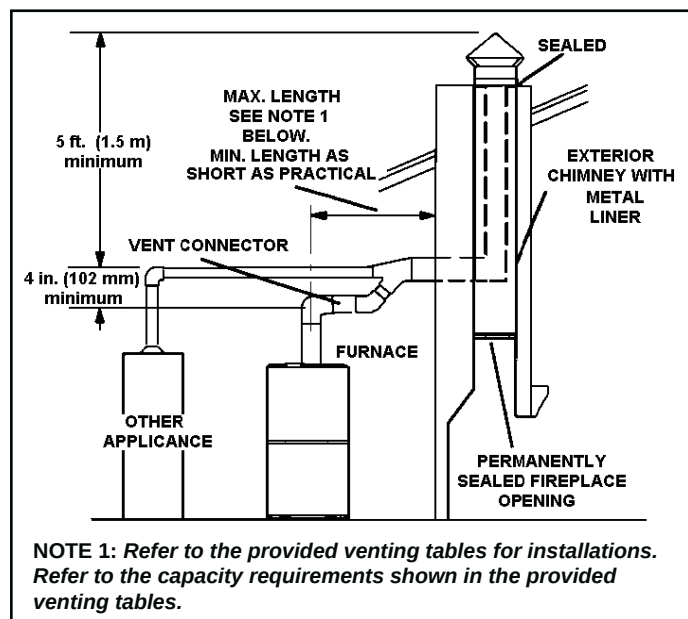


Figure 24. Common Venting Using Metal-Lined Masonry Chimney

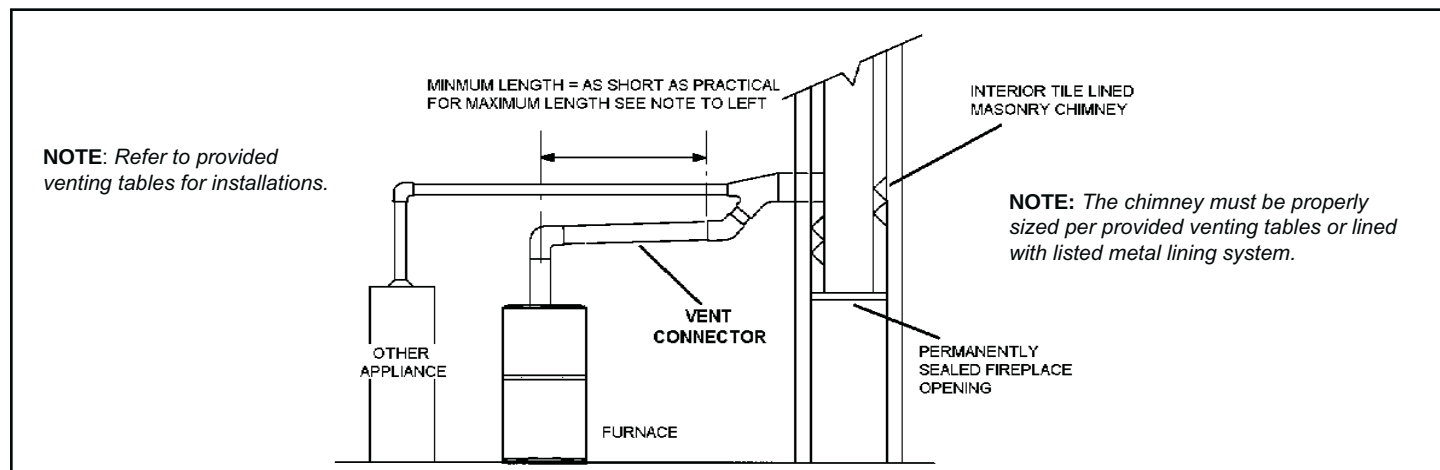


Figure 25. Common Venting Using Tile Lined Interior Masonry Chimney and Combined Vent Connector

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

⚠ IMPORTANT

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

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

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

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

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

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

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

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

Table 2.

9. If the common vertical vent is offset, the maximum common vent capacity listed in the common venting tables should be reduced by 20%, the equivalent of two 90° elbows (0.80 x maximum common vent capacity). The horizontal length of the offset shall not exceed 1-1/2 feet (.46 m) for each inch (25 mm) of common vent diameter.

NOTE: For any Low GWP refrigerant systems with exposed line set joints installed in the same space, each non-direct vent furnace system must have a refrigerant detection sensor installed below the level of the burners (See **SECONDARY SENSOR REQUIREMENTS** on page 41). Any direct vent furnace system is not subject to this requirement.

10. The vent pipe should be as short as possible with the least number of elbows and angles required to complete the job. Route the vent connector to the vent using the shortest possible route.
11. A vent connector shall be supported without any dips or sags and shall slope a minimum of 1/4 inch (6.4 mm) per linear foot (305 mm) of connector, back toward the appliance.
12. Vent connectors shall be firmly attached to the furnace flue collar by self drilling screws or other approved means, except vent connectors of listed type B vent material which shall be assembled according to the manufacturer's instructions. Joints between sections of single wall connector piping shall be fastened by screws or other approved means.
13. When the vent connector used for Category I appliances must be located in or pass through a crawl space, attic or other areas which may be cold, that portion of the vent connector shall be constructed of listed double wall type B vent material or material having equivalent insulation qualities.
14. All venting pipe passing through floors, walls, and ceilings must be installed with the listed clearance to combustible materials and be fire stopped according to local codes. In absence of local codes, refer to NFPA (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 restricter 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.
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 Z223.1.)

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.

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	75	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							
	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

Vent 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	NR	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							
	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.

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 31 and Figure 32.
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.

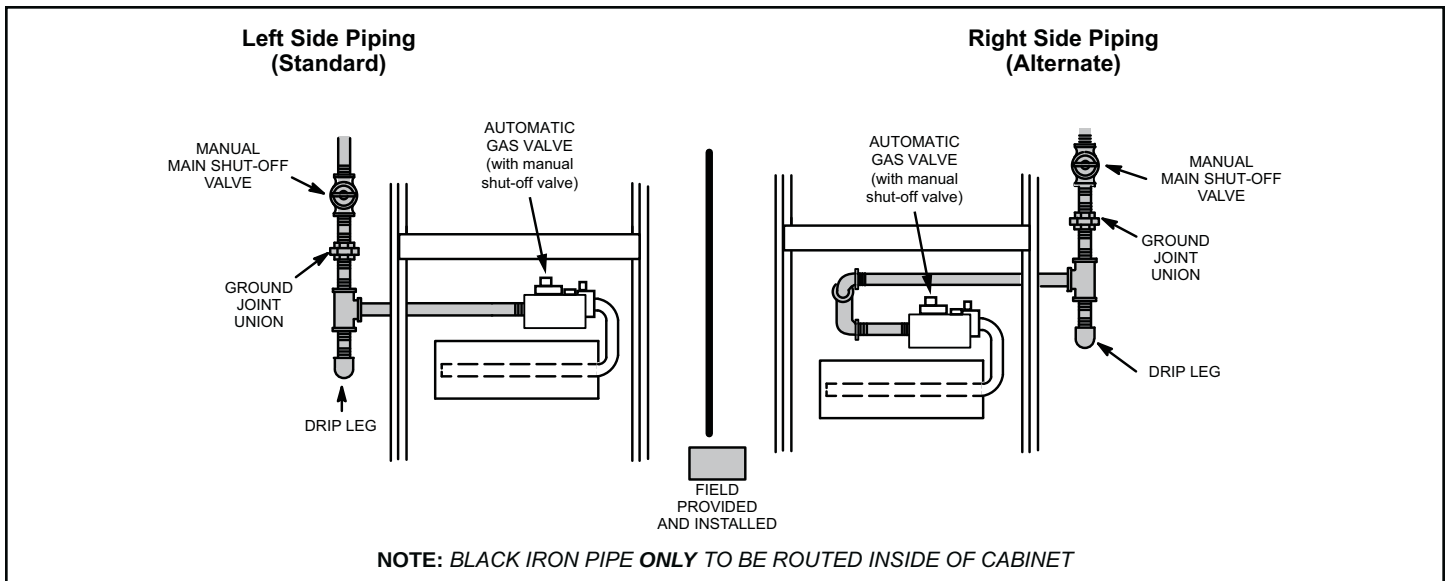
NOTE: If emergency shutoff is necessary, shut off the main manual gas valve and disconnect main power to the furnace. The installer should properly label these devices.

Gas Pipe Capacity - ft³/hr (m³/hr)

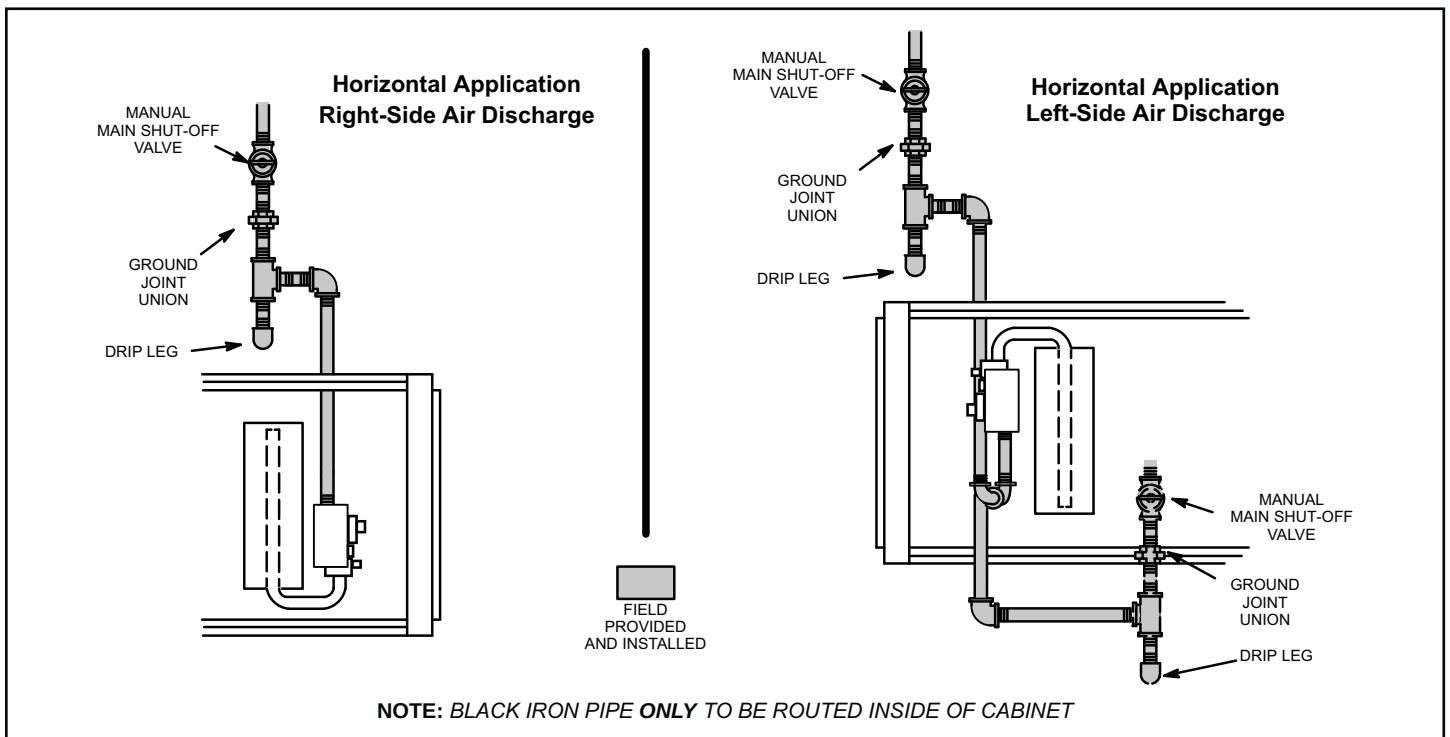
Nominal Iron Pipe Size inches (mm)	Internal Diameter inches (mm)	Length of Pipe - feet (m)									
		10 (3.048)	20 (6.096)	30 (9.144)	40 (12.192)	50 (15.240)	60 (18.288)	70 (21.336)	80 (24.384)	90 (27.432)	100 (30.480)
1/2 (12.7)	.622 (17.799)	175 (4.96)	120 (3.40)	97 (2.75)	82 (2.32)	73 (2.07)	66 (1.87)	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)	1460 (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 0.60 specific gravity gas.

Table 9.



**Figure 26. Upflow Applications
Possible Gas Piping Configurations**



**Figure 27. Horizontal Applications
Possible Gas Piping Configurations**

Leak Check

After gas piping is completed, carefully check all field-installed piping connections for gas leaks. Use a commercially available leak detecting solution specifically manufactured for leak detection. Never use an open flame to test for gas leaks.

The furnace must be isolated from the gas supply system by closing the individual manual shut-off valve during any gas supply system at pressures greater than or equal to 1/2 psig (3.48 kPa, 14 inches w.c.). This furnace and its components are designed, manufactured and independently certified to comply with all applicable ANSI/CSA standards. A leak check of the furnace and its components is not required.

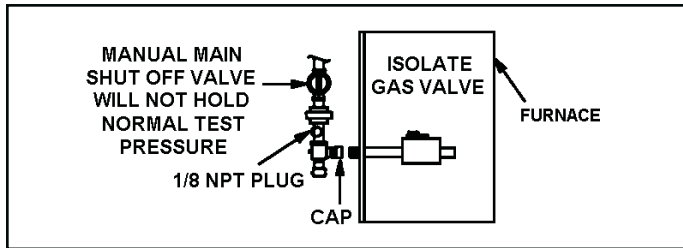


Figure 28.

! 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.).

! WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death, or property damage. Never use an open flame to test for gas leaks. Check all connections using a commercially available soap solution made specifically for leak detection. Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed.

Electrical

ELECTROSTATIC DISCHARGE (ESD) *Precautions and Procedures*

! CAUTION

Electrostatic discharge can affect electronic components. Take precautions to neutralize electrostatic charge by touching your hand and tools to metal prior to handling the control.

! WARNING

Electric Shock Hazard. Can cause injury or death. Unit must be properly grounded in accordance with national and local codes.

! WARNING

Fire Hazard. Use of aluminum wire with this product may result in a fire, causing property damage, severe injury or death. Use copper wire only with this product.

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.

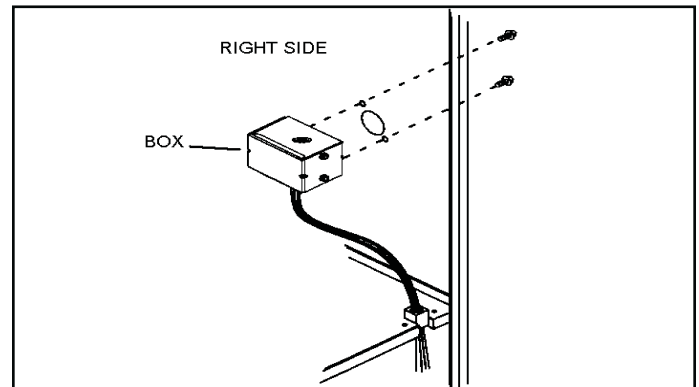


Figure 29. Interior Make-Up Box Installation

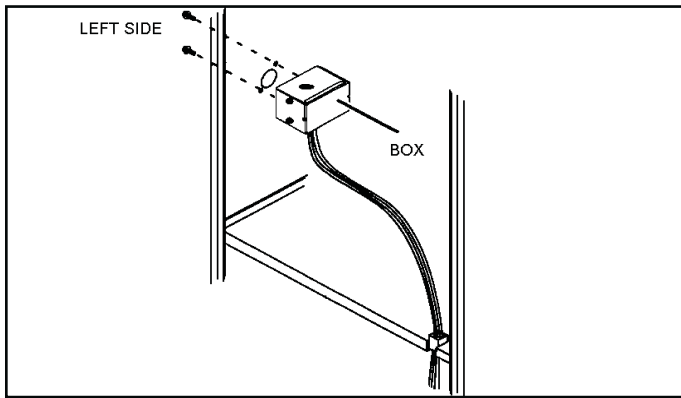


Figure 30. Interior Make-Up Box Installation

! IMPORTANT

When matching this gas furnace with zoning, defrost tempering stat or other 24V accessories, It is recommended to replace the factory installed transformer with kit 27J32.

Kit 27J32 contains a 75VA transformer, so you do not overload the original 40VA transformer.

Refer to Figure 42 for wiring diagram.

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 shown in Table 10.

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.

Capacity	Maximum Over-Current Protection (Amps)
070	15
090, 110	20

Table 10.

4. 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.
5. Complete the wiring connections to the equipment. Use the provided unit wiring diagram shown in Figure 42. Use 18 gauge wire or larger that is suitable for Class II rating for thermostat connections.

! CAUTION

Failure to use properly sized wiring and circuit breaker may result in property damage. Size wiring and circuit breaker(s) per Product Specifications bulletin (EHB) and unit rating plate.

6. 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.

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% RHD.

Electrical Wiring

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 wire. 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 unit's ground wire and actual earth ground (typically a ground stake or buried steel pipe) must be maintained for proper operation.

Adjusting Airflow

				Bottom Return Air							
				Heating CFM @ 0 through 0.8" w.c.				Cooling CFM @ 0 through 1.0" w.c.			
Model	Motor Hp	Stage	Speed Adjustment*	Heat Setting D	Heat Setting C	Heat Setting B	Heat Setting A	Cool Setting D	Cool Setting C	Cool Setting B	Cool Setting A
NF80U070V3A	1/2	2nd	Norm	715	900	934	1026	920	985	1105	1225
		1st	Norm	679	754	842	937	690	735	795	885
NF80U090V4B	1	2nd	Norm	1013	1079	1130	1390	940	1200	1405	1600
		1st	Norm	926	996	1033	1271	600	810	960	1090

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

				Bottom Return Air, Return Air from Both Sides or Return Air from Bottom and One Side							
				Heating CFM @ 0 through 0.8" w.c.				Cooling CFM @ 0 through 1.0" w.c.			
Model	Motor Hp	Stage	Speed Adjustment*	Heat Setting D	Heat Setting C	Heat Setting B	Heat Setting A	Cool Setting D	Cool Setting C	Cool Setting B	Cool Setting A
NF80U110V5C	1	2nd	Norm	1288	1405	1489	1543	1401	1564	1714	1877
		1st	Norm	1178	1301	1361	1410	969	1075	1181	1336

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

				Single Side Return Air							
				Heating CFM @ 0 through 0.8" w.c.				Cooling CFM @ 0 through 1.0" w.c.			
Model	Motor Hp	Stage	Speed Adjustment*	Heat Setting D	Heat Setting C	Heat Setting B	Heat Setting A	Cool Setting D	Cool Setting C	Cool Setting B	Cool Setting A
NF80U070V3A	1/2	2nd	Norm	707	890	925	1013	926	1003	1104	1213
		1st	Norm	673	750	864	949	689	726	795	859
NF80U090V4B	1	2nd	Norm	1013	1075	1130	1394	897	1158	1346	1499
		1st	Norm	926	996	1033	1271	571	778	930	1040
NF80U110V5C	1	2nd	Norm	1277	1368	1447	1501	1375	1526	1687	1843
		1st	Norm	1169	1250	1323	1382	942	1048	1154	1277

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

				Side Return with Optional Return Air Base							
				Heating CFM @ 0 through 0.8" w.c.				Cooling CFM @ 0 through 1.0" w.c.			
Model	Motor Hp	Stage	Speed Adjustment*	Heat Setting D	Heat Setting C	Heat Setting B	Heat Setting A	Cool Setting D	Cool Setting C	Cool Setting B	Cool Setting A
NF80U070V3A	1/2	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
NF80U090V4B	1	2nd	Norm	1017	1079	1140	1390	904	1126	1347	1525
		1st	Norm	930	981	1045	1277	599	762	928	1045
NF80U110V5C	1	2nd	Norm	1280	1367	1431	1505	1469	1536	1654	1813
		1st	Norm	1174	1252	1318	1385	1008	1038	1159	1307

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

Allowable Heating Speeds						
Model	Cooling Capacity	Speed Adjust	Setting "D"	Setting "C"	Setting "B"	Setting "A"
070	3 ton	+10%	Allowed	Allowed	Allowed	Not Allowed
		Norm	Allowed	Allowed	Factory Setting	Allowed
		-10%	Allowed	Allowed	Allowed	Allowed
090	4 ton	+10%	Allowed	Allowed	Allowed	Not Allowed
		Norm	Allowed	Allowed	Factory Setting	Not Allowed
		-10%	Allowed	Allowed	Allowed	Allowed
110	5 ton	+10%	Allowed	Allowed	Allowed	Not Allowed
		Norm	Allowed	Allowed	Factory Setting	Allowed
		-10%	Allowed	Allowed	Allowed	Allowed

Table 11.

Allowable Circulation Speeds	
Model	38% of Second Stage Cooling
All Models	Factory Setting

Table 12.

Start-Up

For Your Safety, Read Before Operating

WARNING

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

WARNING

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

CAUTION

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

WARNING

During blower operation, the ECM motor emits energy that may interfere with pacemaker operation. Interference is reduced by both the sheet metal cabinet and distance.

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

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

Placing the Furnace into Operation

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

WARNING

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

Gas Valve Operation

See Figure 31 and Figure 32

1. **STOP!** Read the safety information at the beginning of this section.
2. Set the thermostat to the lowest setting.
3. Turn OFF all electrical power to the unit.
4. This furnace is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.
5. Remove the heating compartment access panel.
6. Move gas valve switch to OFF position. Do not force. See Figure 31 and Figure 32.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to next step.

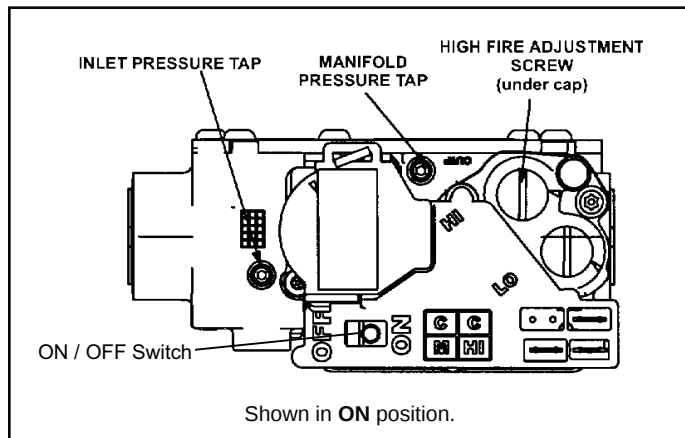


Figure 31. White Rodgers Gas Valve

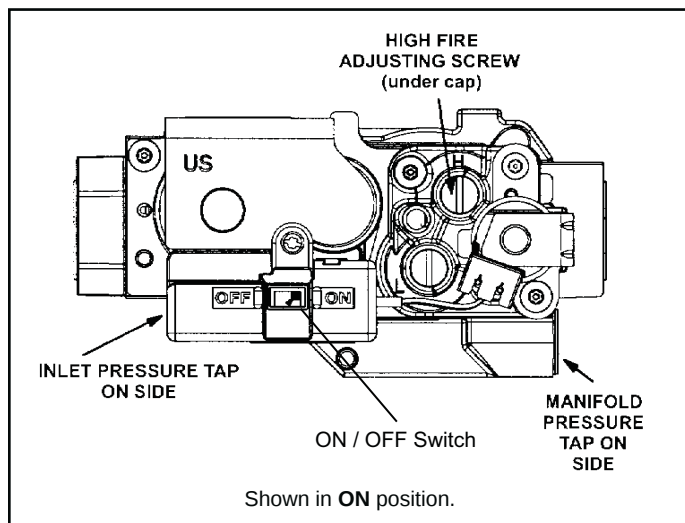


Figure 32. Honeywell Gas Valve

8. Move gas valve switch to ON position. Do not force. See Figure 31 and Figure 32.
9. Replace the heating compartment access panel.

10. Turn ON all electrical power to the unit.

11. Set the thermostat to desired setting.

NOTE: When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.

12. If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call your service technician or gas supplier.

Turning Off Gas to Unit

1. Set the thermostat to the lowest setting.
2. Turn off all electrical power to the unit if service is to be performed.
3. Remove the heating compartment access panel.
4. Move gas valve switch to OFF position. Do not force. See Figure 31 and Figure 32.
5. Replace the upper access panel.

Failure to Operate

If the unit fails to operate, check the following:

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

Gas Pressure Adjustment

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) Divide by two and compare to time in Table 13. If manifold pressure matches Table 15 and rate is incorrect, check gas orifices for proper size and restriction. Remove temporary gas meter if installed.

NOTE: Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.

Gas Meter Clocking Chart				
Capacity	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
070	55	110	136	272
090	41	82	102	204
110	33	66	82	164
Natural - 1000 btu/cu ft			LP - 2500 btu/cu ft	

Table 13.

Supply Line Pressure

A threaded plug on the inlet side of the gas valve provides access to the supply pressure tap.

Honeywell Valve

1. Remove the threaded plug.
2. Install a field provided barbed fitting.
3. Connect a manometer.

White Rodgers Valve

1. Loosen threaded plug (removal not required).
2. Connect a manometer.

See Table 15 for supply line pressure. Replace or tighten the threaded plug after measurements have been taken.

Manifold Pressure

NOTE: A pressure test adapter kit is available to facilitate manifold pressure measurement.

1. Connect test gauge to manifold pressure tap (Figure 31 and Figure 32) on gas valve.
2. Ignite unit on high fire and let run for 5 minutes to allow for steady state conditions.
3. After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in Table 15.
4. If necessary, make adjustments. Figure 31 and Figure 32 show the location of high fire adjustment screw.
5. If an adjustment is made on high fire, re-check manifold pressure on low fire. Do not adjust low fire manifold pressure. If low fire manifold pressure is more than 1/2" above or below value specified in Table 15, replace valve.

Proper Combustion

Furnace should operate a minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue out let and compare to Table 14. The maximum carbon monoxide reading should not exceed 100 ppm.

Firing Rate	CO2% for Nat	CO2% for L.P.
High Fire	6.8 - 7.4	7.5 - 9.0
Low Fire	4.2 - 5.7	5.0 - 6.0

Table 14.

Capacity	Gas	Orifice Size 0 - 7500 ft. ¹	Orifice Size 7501 - 10000 ft.	Manifold Pressure in. w.g. 0 - 4500 ft.		Manifold Pressure in. w.g. 4501 - 7500 ft.		Manifold Pressure in. w.g. 7501 - 10000 ft. ²		Supply Line Pressure in. w.g.	
				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 ³	.034	.032	4.5	10.0	4.5	10.0	4.5	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 ³	.034	.032	4.5	10.0	4.5	10.0	4.5	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 ³	.034	.032	4.5	10.0	4.5	10.0	4.5	10.0	11.0	13.0

¹ This is the only permissible derate for these units.

² Natural gas high altitude orifice kit required.

³ A natural to L.P./propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.

NOTE: Units may be installed at altitudes up to 4500 ft. above sea level without modifications.

Table 15. Manifold and Supply Line Pressure 0 - 10,000 ft.

High Altitude

The manifold pressure, gas orifice and pressure switch may require adjustment or replacement to ensure proper operation at higher altitudes.

WARNING

For safety, shut unit OFF and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.

Primary and Secondary Limits

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

Flame Rollout Switches (Two)

These manually reset switches are located on (or inside of) the burner box. If tripped, check for adequate combustion air before resetting.

Pressure Switches

The pressure switch assembly (includes two switches) is located in the heating compartment adjacent to the combustion air inducer. These switches check for proper combustion air inducer operation before allowing ignition trial. The switches are factory-set and require no adjustment.

Temperature Rise

Place the unit into operation with a second-stage heating demand. After supply and return air temperatures have stabilized, check the temperature rise. If necessary, adjust the heating blower speed to maintain the temperature rise within the range shown on the unit nameplate. See Table 11 for allowable heating speeds. Increase the blower speed to decrease the temperature rise. Decrease the blower speed to increase the temperature rise. Failure to properly adjust the temperature rise may cause erratic limit operation.

Thermostat Heat Anticipation

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

Sequence of Operation

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 20 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 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 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 selected blower off delay time (60/90/120/180 sec) before ramping down and shutting off.

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 runs at 1st 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 38% 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 70% 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 down to continuous fan cfm (38% of high stage cooling) for 45 seconds before completely shutting down the blower.

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 2nd 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 continuous fan cfm (38% of high stage cooling) for 45 seconds before completely shutting down the blower.

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.

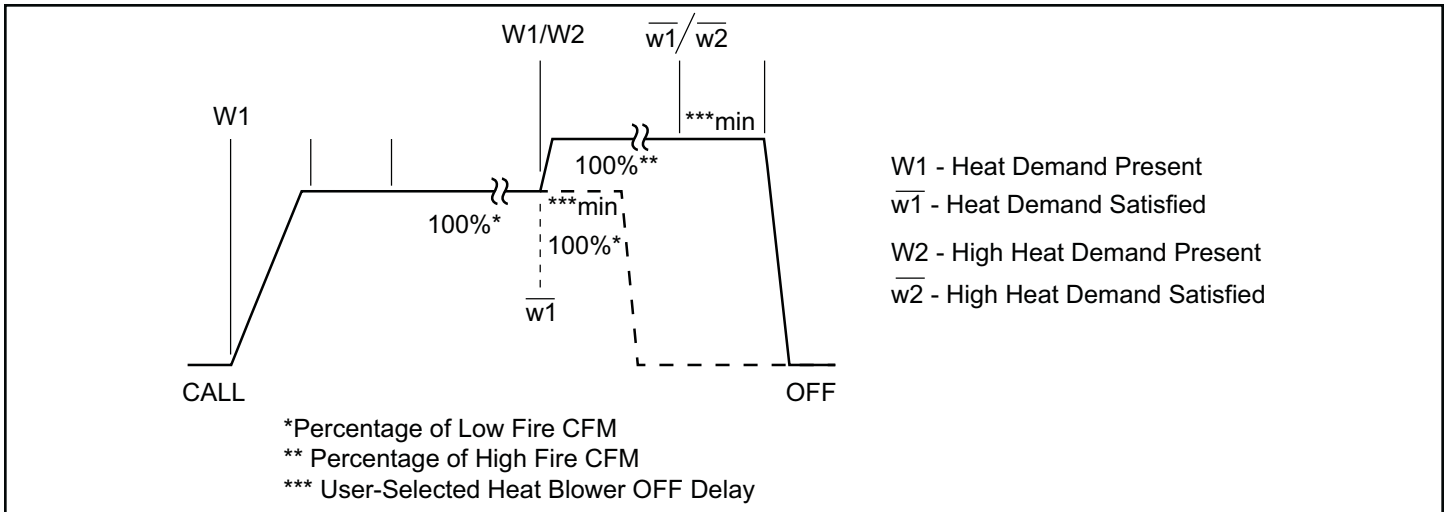


Figure 33. Indoor Blower Operation - 1st Stage-2nd Stage (W1/W2) Heat Call

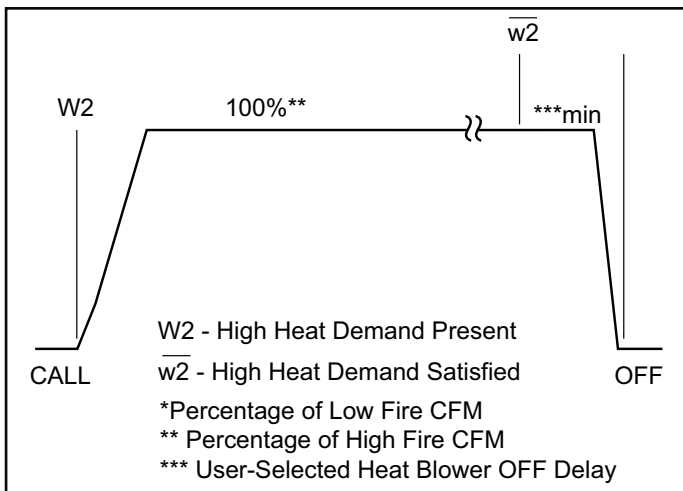


Figure 34. Indoor Blower Operation - High Heat (W2) Call

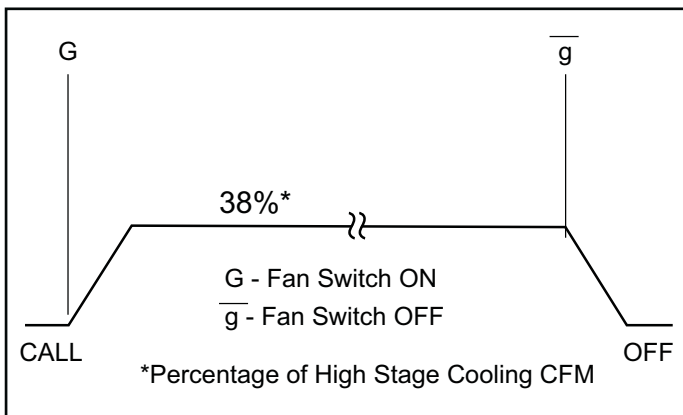


Figure 35. Indoor Blower Operation - Call for Fan

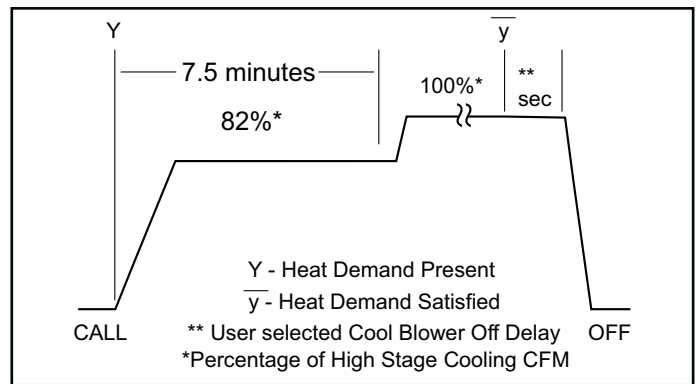


Figure 36. Indoor Blower Operation - Single Stage Cooling

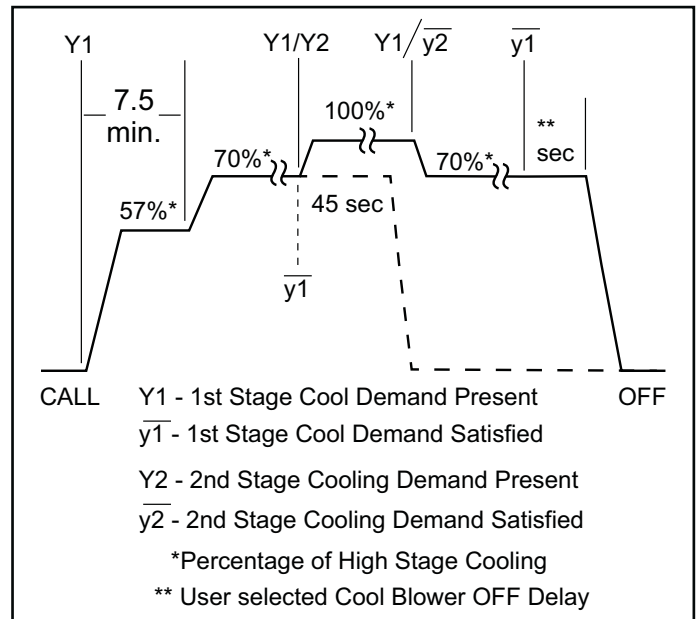


Figure 37. Indoor Blower Operation - Two Stage Cooling

IGNITION CONTROL

Integrated Control DIP Switch Settings Conventional Thermostat

NF80U***V**R units are equipped with a two-stage, variable speed integrated control. This control manages ignition timing, heating mode fan off delays and indoor blower speeds based on selections made using the control dip switches. The control includes an internal watchdog feature which automatically resets the ignition control when it has been locked out. After one hour of continuous thermostat demand for heat, the watchdog will break and remake thermostat demand to the furnace and automatically reset the control to relight the furnace.

Bank Of Four DIP Switches SW1 - DIP Switch Settings

Switch 1 - Thermostat Selection - This unit may be used with either a single-stage or two-stage thermostat. The thermostat selection is made using a DIP switch which must be properly positioned for the particular application. The DIP switch is factory-positioned for use with a two-stage thermostat. If a single-stage thermostat is to be used, the DIP switch must be repositioned.

- Select "OFF" for two-stage heating operation controlled by a two-stage heating thermostat (factory setting);
- Select "ON" for two-stage heating operation controlled by a single-stage heating thermostat. This setting provides a timed delay before second-stage heat is initiated.

Switch 2 - Second Stage Heat Delay (Used with Single-Stage Thermostat Only) - This switch is used to determine the second stage on delay when a single-stage thermostat is being used. The switch is factory-set in the OFF position, which provides a 7-minute delay before second stage heat is initiated. If the switch is toggled to the ON position, it will provide a 12-minute delay before second stage heat is initiated. This switch is only activated when the thermostat selector jumper is positioned for single stage thermostat use.

Switches 3 and 4 - Heat Indoor Blower-Off Delay - The blower-on delay of 30 seconds is not adjustable. The blower-off delay (time that the blower operates after the heating demand has been satisfied) can be adjusted by moving switches 3 and 4 on the integrated control. The unit is shipped from the factory with a blower-off delay of 90 seconds. The blower off delay affects comfort and is adjustable to satisfy individual applications. Adjust the blower off delay to achieve a supply air temperature between 90° and 110°F at the exact moment that the blower is de-energized. Longer off delay settings provide lower supply air temperatures; shorter settings provide higher supply air temperatures. TABLE 16 provides the blower off timings that will result from different switch settings.

Table 16.

Blower Off Delay Switch Settings

Blower Off Delay Seconds	Switch 3	Switch 4
90	Off	On
120 (default)	Off	Off
180	On	Off
210	On	On

Bank Of Eight DIP Switches SW2

Switches 1 and 2 - Cooling Mode Blower Speed - The unit is shipped from the factory with the dip switches positioned for high speed (4) indoor blower motor operation during the cooling mode. TABLE 17 provides the cooling mode blower speeds that will result from different switch settings. Switches 1 and 2 set the blower cfm for second stage cool. The integrated control automatically ramps down to 70% of the second-stage cfm for first-stage cfm. Refer to tables for corresponding cfm values. See Product Specifications for more detailed blower cfm tables.

Table 17.

Cooling Mode Blower Speeds

Speed	Switch 1	Switch 2
Low	On	On
Medium Low	On	Off
Medium High	Off	On
High (factory)	Off	Off

Switches 3 and 4 - Blower Speed Adjustment

The unit is shipped from the factory with the dip switches positioned for NORMAL (no) adjustment. The dip switches may be positioned to adjust the blower speed by +10% or -10% to better suit the application. TABLE 18 below provides blower speed adjustments that will result from different switch settings. Refer to tables for corresponding cfm values. See Product Specifications for more detailed blower cfm tables.

Table 18.

Blower Speed Adjustment

Adjustment	Switch 3	Switch 4
+10 % (approx)	On	Off
Factory Default	Off	Off
-10 % (approx)	Off	On
Field Test (do not use)	On	On

Switch 5 - Cooling / Heat Pump Blower Off Delay

The unit is shipped from the factory with DIP switch positioned OFF for a 45 second delay. TABLE 19 provides the cooling mode off settings.

Table 19.

Blower Off Cooling Mode Delay Switch Setting

Blower Off Delay Seconds	Switch 5
45 (factory)	Off
2	On

Switch 6 Not Used

Switches 7 and 8 - Heating Mode Blower Speeds

These switches are factory set to the OFF position which provides factory default heat speed. See TABLE 20 for switch setting.

Table 20.

Heat Speed	DIP Switch 7	DIP Switch 8
Medium High	Off	Off
High	Off	On
Medium Low	On	Off
Low	On	On

Two Stage, Variable Speed, Non-Communicating 107629-01

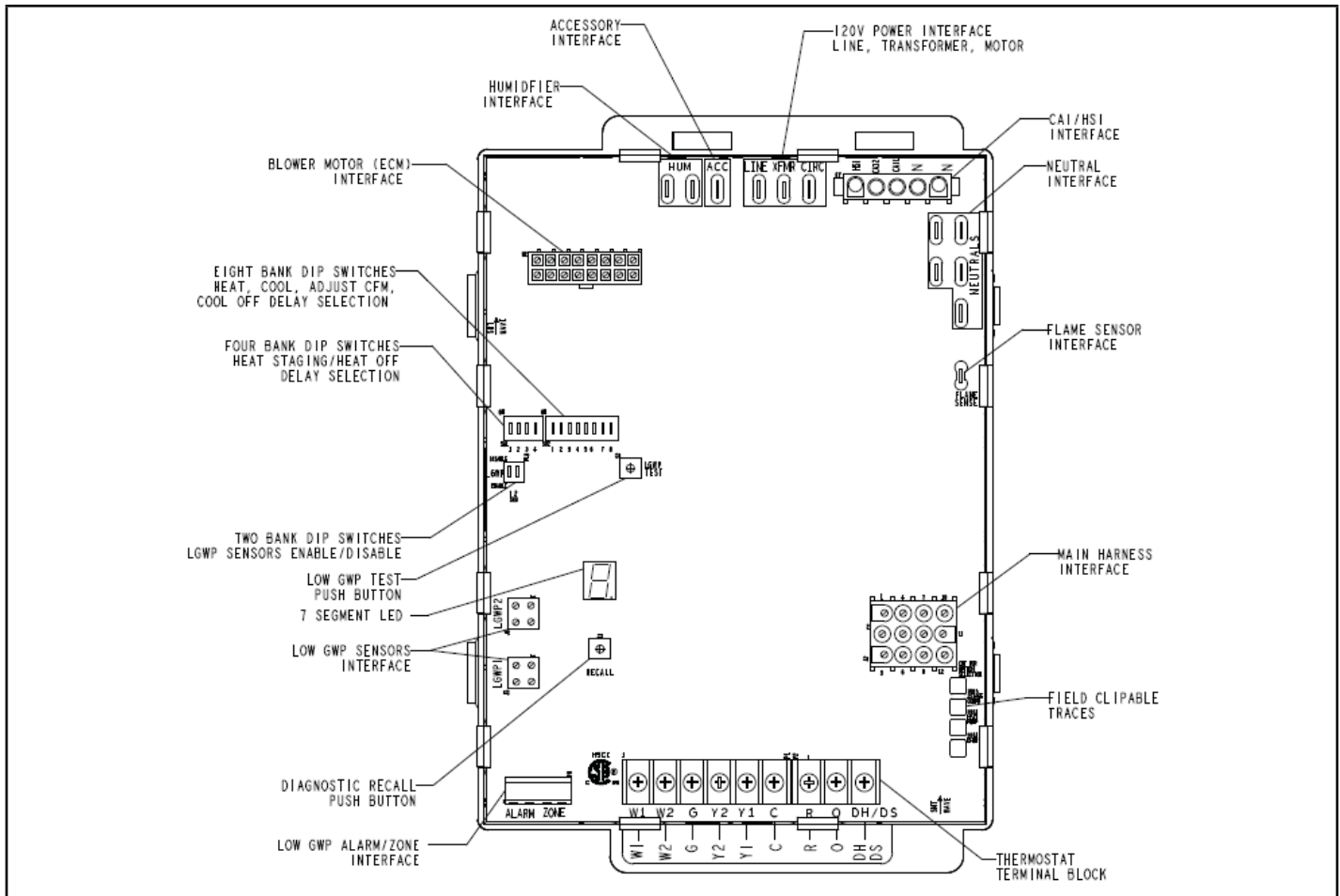


Figure 38.

Table 21.

1/4" QUICK CONNECT TERMINALS	
LINE	120VAC INPUT TO THE CONTROL
XFMR	120VAC OUTPUT TO THE TRANSFORMER
CIRC	120VAC OUTPUT TO THE INDOOR BLOWER
HUM	UNPOWERED NORMALLY OPEN (DRY) CONTACTS
ACC	120VAC OUTPUT TO THE OPTIONAL ACCESSORY
NEUTRALS	120VAC NEUTRALS (5)
3/16" QUICK CONNECT TERMINALS	
FLAME SENSE	FLAME SENSOR INTERFACE

Table 22.

THERMOSTAT INPUT TERMINALS	
W1	LOW STAGE HEAT
W2	HIGH STAGE HEAT
G	FAN
Y1	LOW STAGE COOL (when W915 is clipped)
Y2	HIGH STAGE COOL (when W915 is clipped)
C	THERMOSTAT COMMON / GROUND
R	24VAC POWER TO THE THERMOSTAT
O	HEAT PUMP REVERSING VALVE (when W951 is clipped)
DH / DS	DEHUM / HARMONY (when W914 is clipped)

Table 23.

LOW GWP INTERFACE	
LGWP1	LOW GWP SENSOR #1 INTERFACE
LGWP2	LOW GWP SENSOR # 2 INTERFACE
ALARM	INTERFACE TO LOW GWP LEAK AUDIBLE ALARM (DRY CONTACT)
ZONE	INTERFACE TO ZONING CONTROL FOR LOW GWP APPLICATIONS
LGWP TEST	PUSH BUTTON TO TEST LOW GWP FUNCTIONALITY

CODE	DIAGNOSTIC CODES/STATUS OF FURNACE
.	Idle mode (Decimal blinks at 1 Hertz -- 0.5 second ON, 0.5 second OFF).
A	Cubic feet per minute(cfm) setting for indoor blower (1 second ON, 0.5 second OFF) / cfm setting for current mode displayed.
C	Cooling stage (1 sec. ON, 0.5 sec. OFF) 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes.
d	Dehumidification mode (1 second ON, 1 second OFF) CFM setting displayed / Pause/ Repeat Codes.
H	Gas Heat Stage (1 sec. ON, 0.5 sec. OFF) 1 or 2 displayed / Pause/ cfm displayed / Pause / Repeat codes. Blinking - Ignition.
h	Heat Pump Stage. (1 second ON, 0.5 sec OFF) 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes)
dF	Defrost mode.
E 000	No error in memory
E 110	Low line voltage.
E 111	Line voltage polarity reversed
E 112	Ground not detected
E 113	High line voltage.
E 117	Poor ground detected (Warning only).
E 125	Control failed self-check, internal error, failed hardware. Will restart if error recovers. Covers hardware errors (flame sense circuit faults, pin shorts) etc.
E 150	Refrigerant leak detected
E 151	Refrigerant Leak Detector Sensor #1 Fault
E 152	Refrigerant Leak Detector Sensor #2 Fault
E 154	Refrigerant Leak Detector Sensor #1 Comm. Lost or invalid sensor dip switch configuration (ON/OFF)
E 155	Refrigerant Leak Detector Sensor #2 Comm. Lost
E 160	Refrigerant Leak Detector Sensor #1 Type Incorrect
E 161	Refrigerant Leak Detector Sensor #2 Type Incorrect
E 163	Refrigerant Leak Detector Control Failure
E 164	Low GWP Test
E 200	Hard lockout - Rollout circuit open or previously open.
E 204	Gas valve mis-wired.
E 205	Control gas valve relay contact shorted.
E 207	Hot surface ignitor sensed open - Refer to troubleshooting in installation instruction.
E 223	Low pressure switch failed open - Refer to troubleshooting in installation instruction.
E 224	Low pressure switch failed closed - Refer to troubleshooting in installation instruction.
E 225	High pressure switch failed open - Refer to troubleshooting in installation instruction.
E 226	High pressure switch failed closed - Refer to troubleshooting in installation instruction.
E 227	Low pressure switch opened during trial for ignition or run mode - Refer to troubleshooting in installation instruction.
E 229	Ignition on high fire
E 240	Low flame current - Run mode - Refer to troubleshooting in installation instruction.
E 241	Flame sensed out of sequence - Flame still present.
E 250	Limit switch circuit open - Refer to troubleshooting in installation instruction.
E 270	Soft lockout - Exceeded maximum number of retries. No flame current sensed.
E 271	Soft lockout - Exceeded maximum number of retries. Last retry failed due to pressure switch opening.
E 272	Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to pressure switch opening.
E 273	Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to a flame failure.
E 274	Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to the limit circuit opening or the limit remained open longer than 3 minutes.
E 275	Soft lockout - Flame sensed out of sequence from code 241 fault. Flame signal is gone.
E 292	Indoor blower motor unable to start or unable to communicate with the control.
E 311	Heat rate reduced to match indoor blower air flow. Replace filter or repair duct restriction.
E 390	Low GWP Relay Stuck

On-Board Links

WARNING

Carefully review all configuration information provided. Failure to properly set DIP switches, jumpers and on-board links can result in improper operation!

On-Board Link W914 Dehum or Harmony (R to DS)

On-Board Link W914 Dehum or Harmony (R to DS) On-board link W914, is a clippable connection between terminals R and DS on the integrated control. W914 must be cut when the furnace is installed with either the Harmony III zone control or a thermostat which features humidity control. See active Dehumidification section for more detail. If the link is left intact the PMW signal from the Harmony III control will be blocked and also lead to control damage.

On-Board Link W951 Heat Pump (R to O)

On-board link W951 is a clippable connection between terminals R and O on the integrated control. W951 must be cut when the furnace is installed in applications which include a heat pump unit and a thermostat which features dual fuel use. If the link is left intact, terminal "O" will remain energized eliminating the HEAT MODE in the heat pump.

On-Board Link W915 2 Stage Compr (Y1 to Y2)

On-board link W915 is a clippable connection between terminals Y1 and Y2 on the integrated control. W915 must be cut if two-stage cooling will be used. If the Y1 to Y2 link is not cut the outdoor unit will operate in second-stage cooling only.

Diagnostic Push Button

The diagnostic push button is located adjacent to the seven-segment diagnostic LED. This button is used to enable the Error Code Recall "E" mode and the Flame Signal "F" mode. Press the button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed. When the button is released, the displayed item will be selected. Once all items in the menu have been displayed, the menu resumes from the beginning until the button is released.

Humidifier

An unpowered, normally open (dry) set of contacts with a 1/4" spade terminal "HUM" are provided for humidifier connections and may be connected to 24V or 120V. Any humidifier rated up to one amp can be connected to these terminals. In 120V humidifier applications the neutral leg of the circuit can be connected to one of the provided neutral terminals. This terminal is energized in the heating mode.

Accessory Terminals

One line voltage "ACC" 1/4" spade terminal is provided on the furnace integrated control. Refer to FIGURE 38 for integrated control configuration. This terminal is energized when the indoor blower is operating.

Any accessory rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. If an accessory rated at greater than one amp is connected to this terminal, it is necessary to use an external relay.

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

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

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

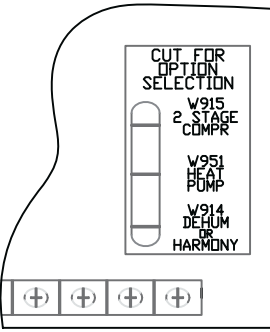
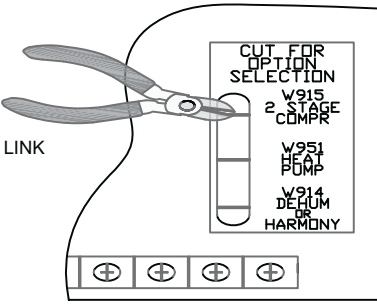
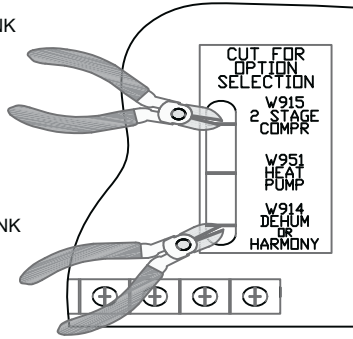
To achieve additional dehumidification, clip the R to DH/DS on the integrated ignition/ blower control board and connect a humidity control that opens on humidity rise to the DEHUM and R terminals. The DEHUM terminal on the control board must be connected to the normally closed contact of the humidity control so that the board senses an open circuit on high humidity. In this setup, the variable speed motor will operate at a 30% reduction in the normal cooling airflow rate when there is a call for dehumidification.

Continuous Blower Operation

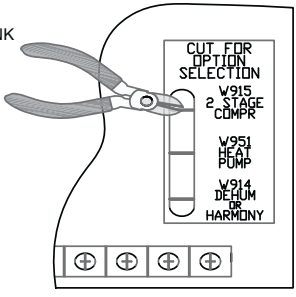
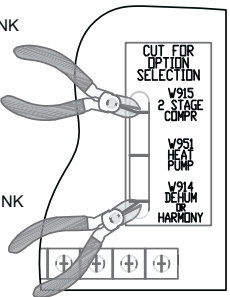
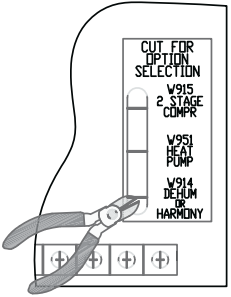
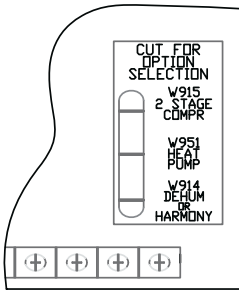
The comfort level of the living space can be enhanced when using this feature by allowing continuous circulation of air between calls for cooling or heating. The circulation of air occurs at the full cooling airflow rate.

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 delay before responding to the call for fan by ramping the circulating blower at to 38% of the cooling speed. When the call for continuous fan is satisfied, the control immediately ramps down the circulating blower.

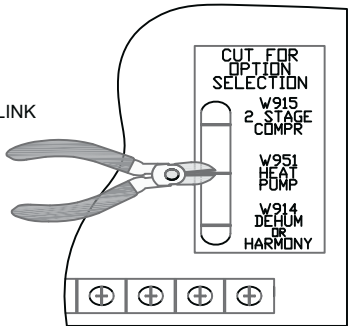
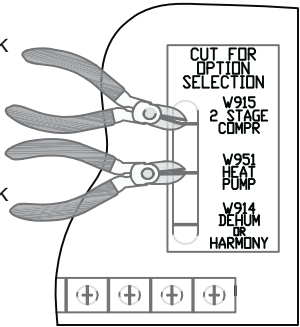
Field Wiring Applications With Conventional Thermostat (see Ignition Control section for DIP switch settings)

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options	
1 Heat / 1 Cool <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.</i>	ON	DO NOT CUT ANY ON-BOARD LINKS 	S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT DH/DS W2 W1 R G C Y Y2 O W2 W1 R G C Y1 Y2 O R C Y
1 Heat / 2 Cool <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.</i>	ON	CUT ON-BOARD LINK W915 2 STAGE COMPR 	S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT DH/DS W2 W1 R G C Y2 Y1 O W2 W1 R G C Y2 Y1 O R C Y2 Y1
1 Heat / 2 Cool with t'stat with humidity control <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-7 minutes. ON-12 minutes.</i>	ON	CUT ON-BOARD LINK W915 2 STAGE COMPR CUT ON-BOARD LINK W914 DEHUM OR HARMONY 	S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT DH/DS W2 W1 R G C Y2 Y1 O DS DH/DS W2 W1 R G C Y2 Y1 O R C Y2 Y1

* Not required on all units.

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options	
2 Heat / 2 Cool	OFF	CUT ON-BOARD LINK W915 2 STAGE COMPR 	S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT (DH/DS) (W2) --- (W2) (W1) --- (W1) (R) --- (R) --- * --- (R) (G) --- (G) (C) --- (C) --- (C) (Y2) --- (Y2) --- (Y2) (Y1) --- (Y1) --- (Y1) (O)
2 Heat / 2 Cool with t'stat with humidity control	OFF	CUT ON-BOARD LINK W915 2 STAGE COMPR CUT ON-BOARD LINK W914 DEHUM OR HARMONY 	S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT (DS) --- (DH/DS) (W2) --- (W2) (W1) --- (W1) (R) --- (R) --- * --- (R) (G) --- (G) (C) --- (C) --- (C) (Y2) --- (Y2) --- (Y2) (Y1) --- (Y1) --- (Y1) (O)
2 Heat / 1 Cool with t'stat with humidity control	OFF	CUT ON-BOARD LINK W914 DEHUM OR HARMONY 	S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT (DS) --- (DH/DS) (W2) --- (W2) (W1) --- (W1) (R) --- (R) --- * --- (R) (G) --- (G) (C) --- (C) --- (C) (Y1) --- (Y1) --- (Y1) (Y2) (O)
2 Heat / 1 Cool	OFF	DO NOT CUT ANY ON-BOARD LINKS 	S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT (DH/DS) (W2) --- (W2) (W1) --- (W1) (R) --- (R) --- * --- (R) (G) --- (G) (C) --- (C) --- (C) (Y2) (Y) --- (Y1) --- (Y1) (O)

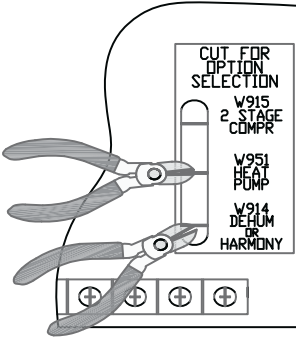
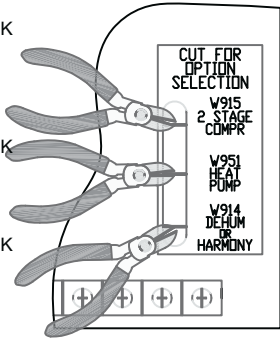
* Not required on all units.

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections																																							
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options																																								
Dual Fuel Single Stage Heat Pump Thermostat w/ dual fuel capa- bilities Capable of 2 stage gas heat control	OFF	CUT ON-BOARD LINK W951 HEAT PUMP 	<table><thead><tr><th>T'STAT</th><th>FURNACE TERM. STRIP</th><th>HEAT PUMP</th></tr></thead><tbody><tr><td>(R) -----</td><td>(R) -----</td><td>(R)</td></tr><tr><td>(H) -----</td><td></td><td></td></tr><tr><td>(W2) -----</td><td>(W2) -----</td><td></td></tr><tr><td>(W1) -----</td><td>(W1) -----</td><td>67M41* ↔</td></tr><tr><td>(O) -----</td><td>(O) -----</td><td>(O)</td></tr><tr><td>(Y1) -----</td><td>(Y1) -----</td><td>(Y)</td></tr><tr><td>(Y2) -----</td><td></td><td></td></tr><tr><td>(G) -----</td><td>(G) -----</td><td></td></tr><tr><td>(D) -----</td><td>(DH/DS)</td><td></td></tr><tr><td>(B) -----</td><td>(Y2) -----</td><td></td></tr><tr><td>(C) -----</td><td>(C) -----</td><td>(C)</td></tr></tbody></table>	T'STAT	FURNACE TERM. STRIP	HEAT PUMP	(R) -----	(R) -----	(R)	(H) -----			(W2) -----	(W2) -----		(W1) -----	(W1) -----	67M41* ↔	(O) -----	(O) -----	(O)	(Y1) -----	(Y1) -----	(Y)	(Y2) -----			(G) -----	(G) -----		(D) -----	(DH/DS)		(B) -----	(Y2) -----		(C) -----	(C) -----	(C)			
T'STAT	FURNACE TERM. STRIP	HEAT PUMP																																								
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Dual Fuel Two Stage Heat Pump Thermostat w/ dual fuel capa- bilities Capable of 2 stage gas heat control	OFF	CUT ON-BOARD LINK W915 2 STAGE COMPR  CUT ON-BOARD LINK W951 HEAT PUMP	<table><thead><tr><th>T'STAT</th><th>FURNACE TERM. STRIP</th><th>HEAT PUMP</th></tr></thead><tbody><tr><td>(R) -----</td><td>(R) -----</td><td>(R)</td></tr><tr><td>(H) -----</td><td></td><td></td></tr><tr><td>(W2) -----</td><td>(W2) -----</td><td></td></tr><tr><td>(W1) -----</td><td>(W1) -----</td><td>67M41* ↔</td></tr><tr><td>(O) -----</td><td>(O) -----</td><td>(O)</td></tr><tr><td>(L) -----</td><td></td><td>(L)</td></tr><tr><td>(Y1) -----</td><td>(Y1) -----</td><td>(Y1)</td></tr><tr><td>(Y2) -----</td><td></td><td>(Y2)</td></tr><tr><td>(G) -----</td><td>(G) -----</td><td></td></tr><tr><td>(D) -----</td><td>(DH/DS)</td><td></td></tr><tr><td>(B) -----</td><td>(Y2) -----</td><td>Y2 out blue</td></tr><tr><td>(C) -----</td><td>(C) -----</td><td>(C)</td></tr></tbody></table>	T'STAT	FURNACE TERM. STRIP	HEAT PUMP	(R) -----	(R) -----	(R)	(H) -----			(W2) -----	(W2) -----		(W1) -----	(W1) -----	67M41* ↔	(O) -----	(O) -----	(O)	(L) -----		(L)	(Y1) -----	(Y1) -----	(Y1)	(Y2) -----		(Y2)	(G) -----	(G) -----		(D) -----	(DH/DS)		(B) -----	(Y2) -----	Y2 out blue	(C) -----	(C) -----	(C)
T'STAT	FURNACE TERM. STRIP	HEAT PUMP																																								
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* Connect W1 to W1 ONLY if using defrost tempering kit 67M41

NOTE - **Do NOT** make a wire connection between the room thermostat L terminal and the L terminal of the furnace integrated control.

Field Wiring Applications With Conventional Thermostat (see Ignition Control section for DIP switch settings)

Thermostat	DIP Switch Settings and On-Board Links		Wiring Connections
	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options	
Dual Fuel Single Stage Heat Pump Thermostat w/ dual fuel capa- bilities Capable of 2 stage gas heat control w/dehu- midification control	OFF	CUT ON-BOARD LINK W951 HEAT PUMP CUT ON-BOARD LINK W914 DEHUM OR HARMONY 	T'STAT FURNACE HEAT PUMP TERM. STRIP R --- R --- R H --- W2 --- 67M41* --- W W2 --- W1 --- W O --- O --- O L --- L --- L Y1 --- Y1 --- Y Y2 --- Y2 --- Y G --- G --- G D --- DH/DS --- Y2 --- C B --- Y2 --- C C --- C --- C
Dual Fuel Two Stage Heat Pump Thermostat w/ dual fuel capa- bilities Capable of 2 stage gas heat control w/dehu- midification	OFF	CUT ON-BOARD LINK W915 2 STAGE COMPR CUT ON-BOARD LINK W951 HEAT PUMP CUT ON-BOARD LINK W914 DEHUM OR HARMONY 	T'STAT FURNACE HEAT PUMP TERM. STRIP R --- R --- R H --- W2 --- 67M41* --- W W2 --- W1 --- W O --- O --- O L --- L --- L Y1 --- Y1 --- Y1 Y2 --- Y2 --- Y2 G --- G --- G D --- DH/DS --- Y2 --- C B --- Y2 --- C C --- C --- C Y2 out blue

* Connect W1 to W1 ONLY if using defrost tempering kit 67M41

NOTE - Do NOT make a wire connection between the room thermostat L terminal and the L terminal of the furnace integrated control.

Low GWP Application

⚠ WARNING

For use with GE Appliances approved evaporator coil and LGWP sensors only. Use original manufacturer recommended LGWP sensors if using non GE Appliances approved evaporator coil.

CONNECTING THE FURNACE CONTROL BOARD SENSOR.

See **FIGURE 41** and follow steps below:

- 1 - Route sensor wire #1 through provided grommet. Form a drip loop below the control board on upflow installations to prevent condensate dripping on the control board.
- 2 - Avoid sharp edges when routing sensor wire during installation.
- 3 - Sensor wire must not block view of 7 segment LED .

Ensure the cable is properly seated into the SENSOR 1 plug (LGWP1). The Molex plug clip should lock into the Molex connection point for a secured connection, as shown below in **FIGURE 39** Verify the connection is free of dust, debris, and moisture.

NOTE - In confined space applications, connect the second sensor to the SENSOR 2 plug (LGWP2). Refer to evaporator coil installation instructions for more detail.

Two Stage Variable Speed Control



Figure 39.

LOW GWP DIP SWITCH SETTINGS

Adjust the DIP switch settings to the sensor configuration. Failure to do so will cause faults on power-up. See **FIGURE 40** and **TABLE 24**.

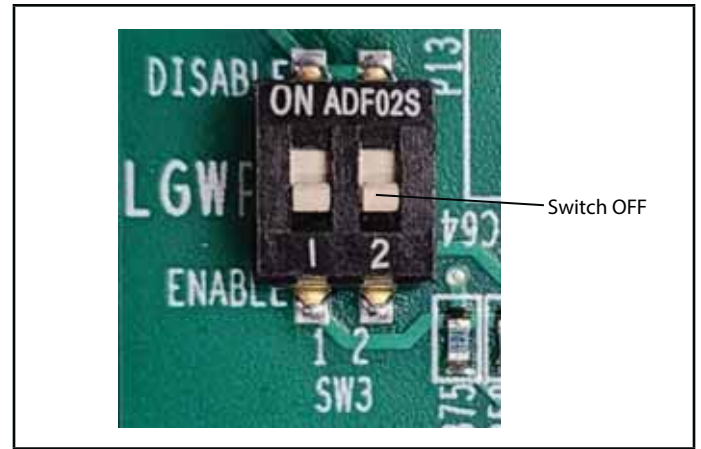


Figure 40.

Table 24.

DIP Switch Settings

Configuration	Switch 1	Switch 2
One (1) sensor, connected to SENSOR 1 plug	OFF (enable)	ON (disable)
Two (2) sensors, connected to SENSOR 1 plug and SENSOR 2 plug	OFF (enable)	OFF (enable)

In single sensor configurations, the sensor must be connected to the SENSOR 1 plug (LGWP1). Configurations other than the ones shown in **TABLE 24** will cause a servicing fault.

Each DIP switch corresponds to a sensor position (i.e., DIP switch 1 to sensor 1; DIP switch 2 to sensor 2). The default factory switch positions are set to OFF (ENABLED)

The furnace control board software reads the OFF position as an active sensor. A sensor should be present for the corresponding sensor connector. Setting the DIP switch to ON disables the sensor position.

SECONDARY SENSOR REQUIREMENTS

Additional Line Sets

If additional refrigerant line joints are present outside of the line set sleeve and a secondary refrigerant detection sensor is required, its installation must comply with the requirement listed in Refrigeration Detection Sensor kit (27V53). See **FIGURE 41** for routing the secondary sensor cable through the furnace cabinet.\

Non-Low GWP Applications

⚠ IMPORTANT

For Furnace only applications or Furnace replacement in a Non-Low GWP applications, the Low GWP sensors should be disabled, otherwise the blower will operate continuously. To do this, the Low GWP DIP switches setting for both – Sensor 1 and the Sensor 2 must be moved to the ON position.

FURNACE CONTROL BOARD LOW GWP MODES OF OPERATION

The modes of operation for the furnace control board are Initializing, Normal, Leak Detected, and Fault.

Initializing

The furnace control board is establishing connection with the refrigerant detection sensor and is completing an initial five-minute purge sequence.

Normal

The HVAC system is functioning normally. The furnace control board has not detected a refrigerant leak.

Leak Detected

When the furnace control board detects a refrigerant leak:

1. The furnace control board shuts off the (R) input (24VAC power) to the thermostat, which de-energizes the outdoor unit compressor and heat sources, such as gas and/or electric strip heat. No heating or cooling demands will be met.

2. The furnace control board activates the blower (high speed). The blower purges refrigerant from the cabinet, plenum, and ductwork.
3. After the furnace control board determines the refrigerant levels are below the safety threshold, the blower will continue to operate for the remainder of the seven (7) -minute cycle.
4. After the blower sequence is complete, the HVAC system resumes normal operation.

NOTE - The HVAC system may not maintain a cooling or heating set point if a significant leak exists. Any refrigerant leaks that remain unaddressed for an extended time may cause the HVAC system to shut down on a low refrigerant pressure limit condition.

Fault

When a Low GWP fault is detected by the furnace control board, the indoor unit blower engages and remains engaged at a constant air flow output until the fault is cleared.

NOTE - See "IGNITION CONTROL DIAGNOSTIC CODES" on page 35 for Low GWP diagnostic error codes

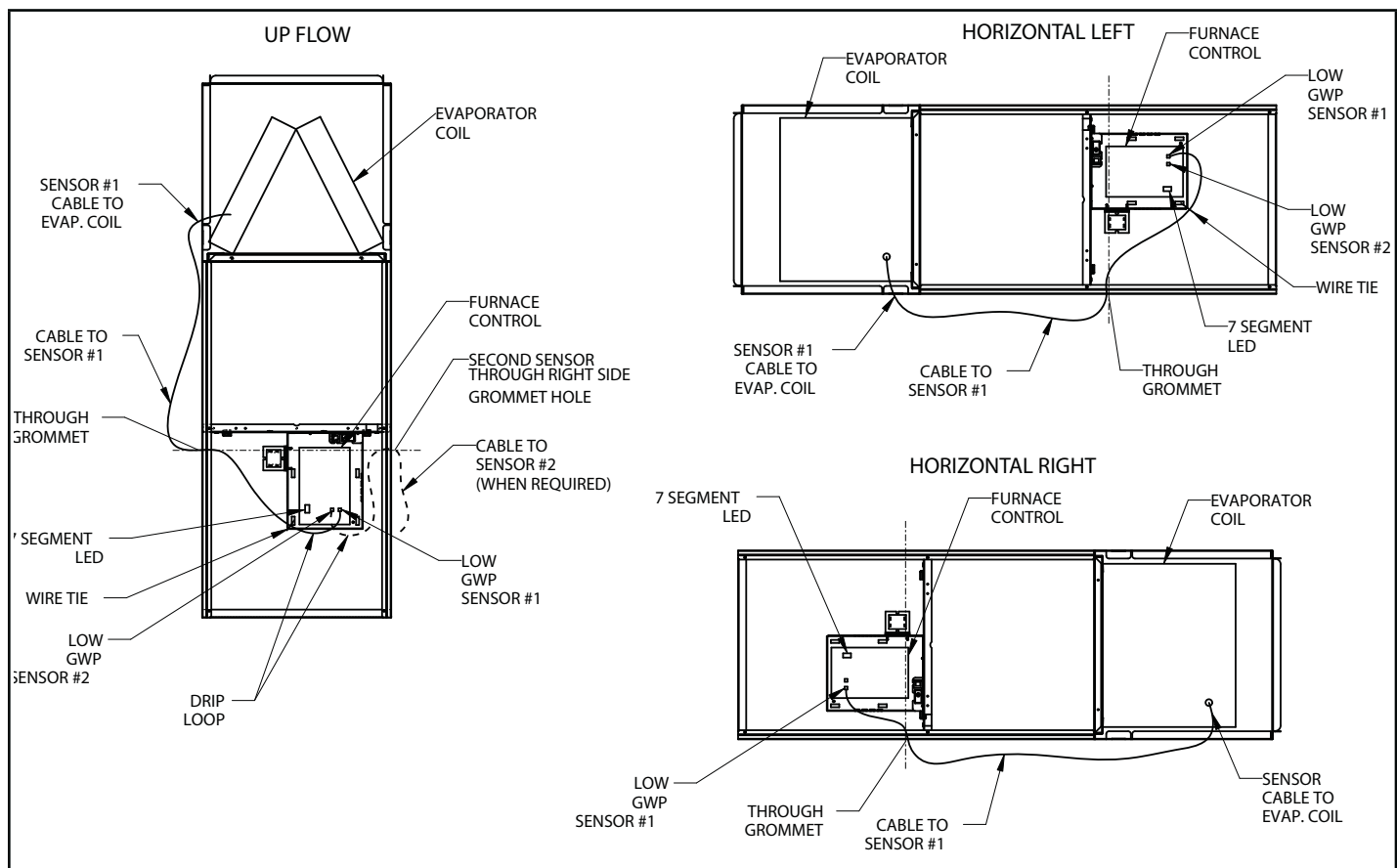


Figure 41.

LGWP TEST BUTTON FUNCTIONALITY

The furnace control board is equipped with a Test/Reset push button. The Test button can be used to perform several functions, depending on the mode of operation of the furnace control board.

TABLE 25 lists the functions of the Test button during each mode of operation.

Table 25.

LGWP Test Button Function

Mode of Operation	Press the Test Button to:
Normal	Trigger a leak detection response. Verify all equipment is wired correctly into the furnace blower control board (after installation).
Leak Detected	Reset the furnace control board to a normal mode of operation after a previous leak has been detected and purged from the HVAC system
Fault	Reset the furnace control board after troubleshooting and resolving a fault condition. If the fault is not resolved, the furnace control board will enter the Fault mode again.

LGWP Test Button - Additional Functions

TABLE 26 lists the additional functions of the Test Button while the furnace control board is functioning within the states of Initializing, Monitoring, Leak Detection, Servicing and Fault.

Table 26.

Additional Button Functions

State	Press	Action
Initializing	Short	Skips remaining pre-purge after sensors are recognized by the furnace control board
Initializing	Long	Reset control
Monitoring	Short	Clear purge-counter if prior mitigation has occurred; Test mitigation
Monitoring	Long	Reset control
Mitigating	Short	If testing mitigation, end test
Servicing	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Servicing	Long	Reset control
Fault	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Fault	Long	Reset control

External Alarm

(For applications with external alarms wired directly to the furnace control board)

The furnace control board triggers the external alarm system when it enters Leak Detected mode. For alarm notifications, the furnace control board provides a dry relay contact that is rated 3A at 30 VAC/DC.

THERMOSTAT COMPATIBILITY

Thermostats that preserve memory settings are compatible with the furnace control board. Examples include:

- Battery-powered thermostats
- Analog Thermostat
- Late-model programmable thermostats

NOTE - *Early-generation digital and programmable thermostats may not retain the operation mode and temperature setpoints after a power outage.*

The following scenarios are likely to occur when home occupants are not available to adjust the thermostat setpoints as the system is recovering from leak detection and resuming normal operation:

- Heating could be lost during a cold night
- Cooling could be lost during a hot day
- The thermostat could reset to an incorrect temperature setpoint

START UP PROCEDURE

The furnace control board is equipped with a LGWP Test/Reset button, see Test Button Functionality. After the furnace control board has been mounted and wired, restore power to the HVAC system. The system will then run through a purge sequence for five minutes. After the purge sequence is complete, proceed to testing cooling demand and heating demand.

Cooling Demand

1. Prompt a cooling demand at the thermostat.
2. Press the LGWP Test button on the furnace control board.
The system then executes a leak detection response.
3. Observe the following sequence:
 - a. The LED indicator for leak detection. *See page 35 for diagnostic error codes.*
 - b. The blower powers up.
 - c. The outdoor compressor powers down.
4. Press the LGWP Test button to terminate the simulated Leak Detected mode upon test completion

Heating Demand

1. Prompt a heating demand at the thermostat.
2. Press the LGWP Test button on the furnace control board.
3. Observe the following sequence:
 - a. The LED indicator for leak detection. *See page 35 for diagnostic codes.*
 - b. The blower powers up.
 - c. The gas burners power down.
 - d. The outdoor compressor powers down.
4. Press the LGWP Test button to terminate the simulated Leak Detected mode upon test completion.

The installation of the furnace control board is complete after.

Maintenance

WARNING

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.

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

Blower

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

WARNING

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

Filters

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

Flue and Chimney

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

Electrical

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

Unit Nameplate _____ Actual _____

Planned Service

The following items should be checked during an annual inspection. Power to the unit must be shut off for the service technician's safety.

Fresh air grilles and louvers (on the unit and in the room where the furnace is installed) - Must be open and unobstructed to provide combustion air.

Burners - Must be inspected for rust, dirt, or signs of water.

Vent pipe - Must be inspected for signs of water, damaged or sagging pipe, or disconnected joints.

Unit appearance - Must be inspected for rust, dirt, signs of water, burnt or damaged wires, or components.

Blower access panel - Must be properly in place and provide a seal between the return air and the room where the furnace is installed.

Return air duct - Must be properly attached and provide an air seal to the unit.

Operating performance - Unit must be observed during operation to monitor proper performance of the unit and the vent system.

Combustion gases - Flue products must be analyzed and compared to the unit specifications.

Problems detected during the inspection may make it necessary to temporarily shut down the furnace until the items can be repaired or replaced.

Instruct the homeowners to pay attention to their furnace. Situations can arise between annual furnace inspections that may result in unsafe operation. For instance, items innocently stored next to the furnace may obstruct the combustion air supply. This could cause incomplete combustion and the production of carbon monoxide gas.

Low GWP Sensor/Sleeve

Inspect the low GWP sensor / sensors and rubber sleeve.

Repair Parts List

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. All service must be performed by a licensed professional installer (or equivalent), service agency, or gas supplier.

Cabinet Parts

- Heating compartment access panel
- Blower access panel
- Top cap

Control Panel Parts

- Transformer
- Two-stage, variable speed integrated control
- Door interlock switch

Blower Parts

- Blower wheel
- Blower housing
- Motor
- Motor electronics
- Power Choke (1 hp only)
- Motor mounting frame
- Blower housing cutoff plate

Heat Parts

- Flame sensor
- Heat exchanger assembly
- Gas Manifold
- Two speed combustion air inducer
- Two stage gas valve
- Main burner cluster
- Main burner orifices
- Pressure switch
- Ignitor
- Primary limit control
- Flame rollout switch
- Secondary limit

Low GWP Refrigerant Detection System Parts

- Refrigerant Detection Sensor
- Refrigerant Line Set Sleeve

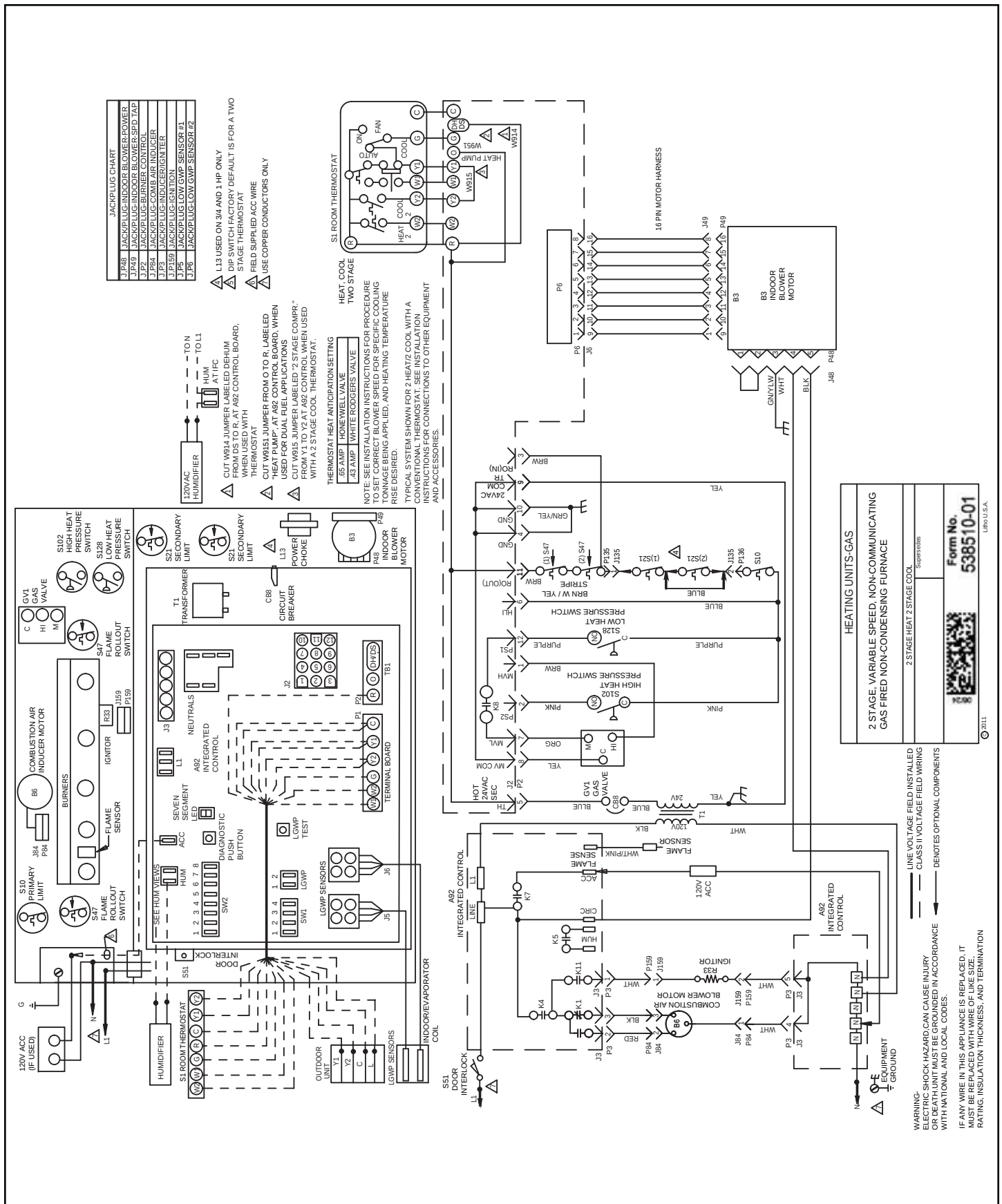


Figure 42. Wiring Diagram