



GE APPLIANCES



INSTALLATION INSTRUCTIONS

NF97X***V**R

Warm Air Gas Furnace Upflow/ Horizontal Left/Right Air Discharge Direct Vent Ultra Low NOx

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 HVAC 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.

NOTICE

A thermostat is not included and must be ordered separately.

- In non-communicating applications, any GE Appliances conventional thermostat may be used, as well as other non-communicating thermostats.

In all cases, setup is critical to ensure proper system operation.

Field wiring for non-communicating applications is illustrated in diagrams which begins on page 39.

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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CAUTION

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



(P) 508625-01G

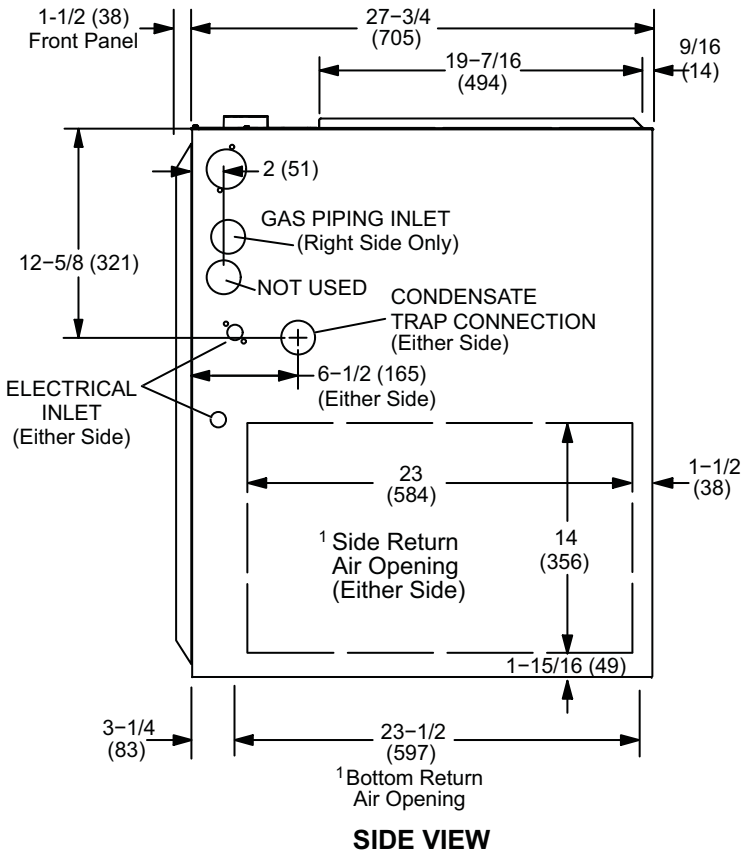
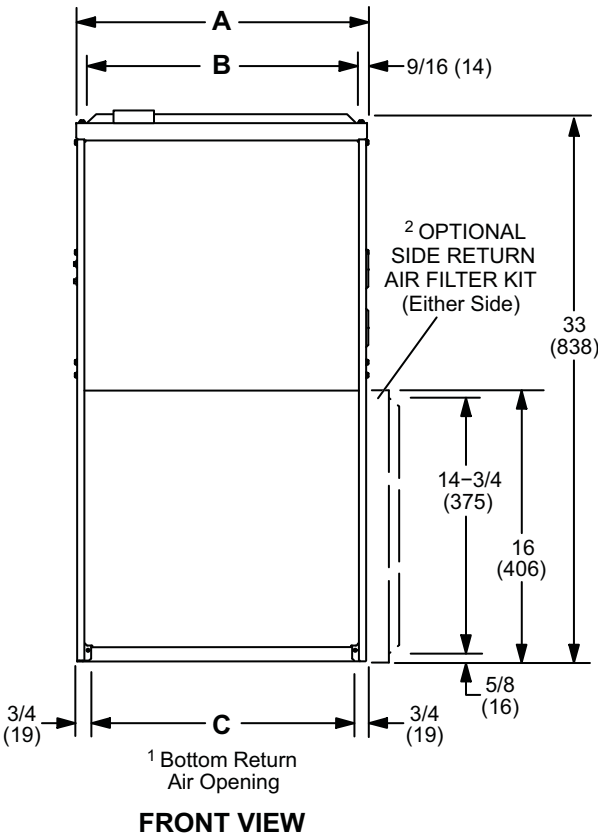
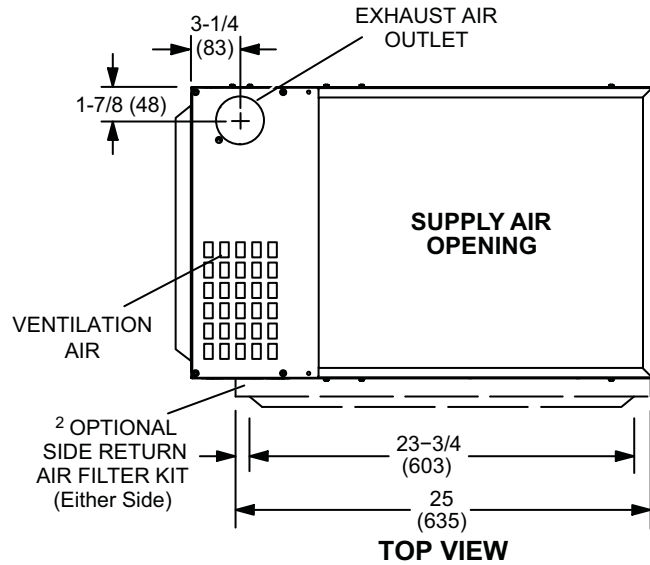
GE is a trademark of the General Electric Company. Manufactured under trademark license.

Unit Dimensions Inches (mm)

¹ NOTE - C5 size units that require second stage air volumes over 1800 cfm must have one of the following:

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

² Optional External Side Return Air Filter kit is not for use with optional Return Air Base.



Model	Cooling Capacity	A		B		C	
		in.	mm	in.	mm	in.	mm
040V3B	3 ton	17-1/2	446	16-3/8	416	16	406
060V3B	3 ton						
080V4C	4 ton	21	553	19-7/8	505	19-1/2	495
080V5C	5 ton						

Parts Arrangement



Figure 1.

NF97X***V**R Gas Furnace

The NF97X***V**R Category IV gas furnace is shipped ready for installation in the upflow or horizontal position. The furnace is shipped with the bottom panel in place. The bottom panel must be removed if the unit is to be installed in horizontal or upflow applications with bottom return air.

The NF97X*V**R is to be installed as Direct Vent gas central furnace only.**

The furnace is equipped for installation in natural gas applications only.

These furnaces comply with the 14 Ng/J NOx emission required by some Air Quality Management Districts in the State of California.

NOTE: *In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged outdoors.*

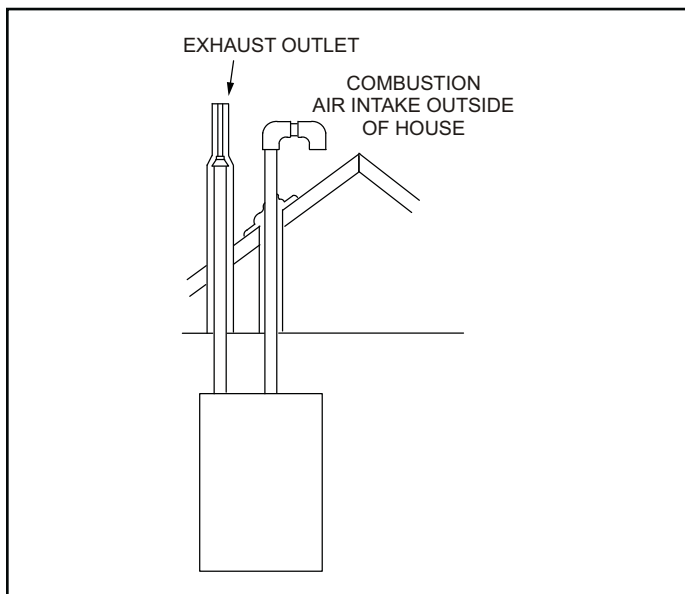


Figure 2. Direct Vent Installation

Shipping and Packing List

Package 1 of 1 contains

- 1 - Assembled NF97X***V**R unit
- 1 - Bag assembly containing the following:
 - 1 - Snap bushing
 - 1 - Snap plug
 - 1 - Wire tie
 - 1 - Condensate trap
 - 1 - Condensate trap cap
 - 1 - Condensate trap clamp
 - 1 - 2" diameter debris screen

1 - 3/4" Threaded street elbow

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.

The following items may also be ordered separately:

- 1 - Thermostat
- 1 - Return air base kit
- 1 - Horizontal suspension kit

Safety Information

CAUTION

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

Use only the type of gas approved for use with this furnace. Refer to unit nameplate.

NF97X***V**R units are CSA International certified to ANSI Z21.47 and CSA 2.3 standards.

Building Codes

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/NFPA 54). The National Fuel Gas Code is available from the following address:

American National Standards Institute, Inc.
11 West 42nd Street
New York, NY 10036

In order to ensure proper unit operation, combustion and ventilation air supply must be provided according to the current National Fuel Gas Code or CSA-B149 standard.

Installation Locations

This furnace is CSA International certified for installation clearances to combustibles material as listed on the unit nameplate and in the table in Figure 5 or Figure 11. Accessibility and service clearances must take precedence over fire protection clearances.

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

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 or CSA B149 standards.

NOTE: Furnace must be adjusted to obtain a temperature rise within the range specified on the unit nameplate. Failure to do so may cause erratic limit operation and 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 coils (Figure 3), it shall be installed in parallel with, or on the upstream side of, cooling coils to avoid condensation in the heating compartment. 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.

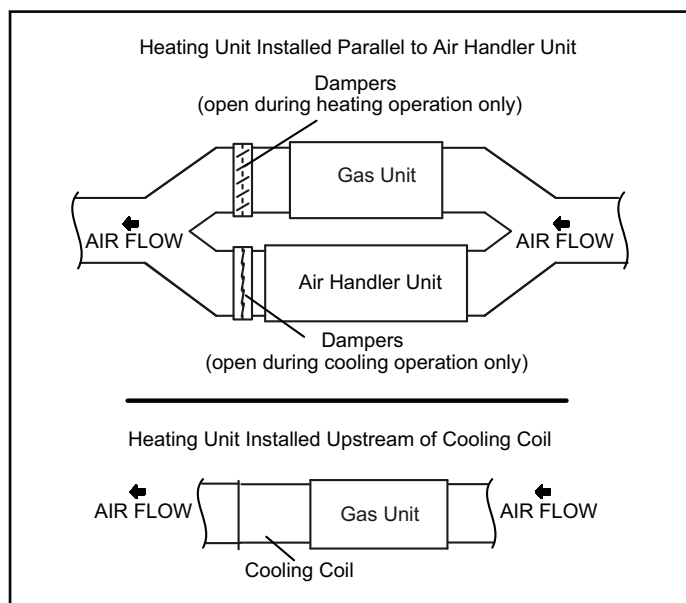


Figure 3.

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.

The NF97X***V**R furnace may be installed in alcoves, closets, attics, basements, garages, crawl spaces and utility rooms in the upflow or horizontal position.

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

Use of Furnace as a Construction Heater

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

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

- a. Furnace must be in its final location. The vent system must be permanently installed per these installation instructions.
- b. Furnace must be installed as a two pipe system and one hundred percent (100%) outdoor air must be provided for combustion air requirements during construction.
- c. A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is prohibited.
- d. The input rate and temperature rise must be set per the furnace rating plate.
- e. Supply and Return air ducts must be provided and sealed to the furnace. Return air must be terminated outside of the space where furnace is installed.
- f. Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.
- g. MERV 11 or greater air filters must be installed in the system and must be regularly inspected and maintained (e.g., regular static checks and replaced at end of life) during construction.
- h. Blower and vestibule access panels must be in place on the furnace at all times.
- i. The furnace heat exchanger, components, duct system, and evaporator coils must be thoroughly cleaned following final construction clean-up.
- j. Air filters must be replaced upon construction completion.
- k. All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified in accordance with these installation instructions.

- i. 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.

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

General

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

In addition to the requirements outlined previously, the following general recommendations must be considered when installing a NF97X***V**R furnace:

- Place the furnace as close to the center of the air distribution system as possible. The furnace should also be located close to the vent termination point.
- When the furnace is installed in an attic or other insulated space, keep insulation away from the furnace.
- When the furnace is installed in an unconditioned space, consider provisions required to prevent freezing of condensate drain system.
- Please consult the manufacturer of your evaporator coil for their recommendations on distance required between the heat exchanger and their drain pan. Adequate space must be provided between the drain pan and the furnace heat exchanger.

CAUTION
NF97X***V**R unit should not be installed in areas normally subject to freezing temperatures.

Shipping Bolt Removal

Units with 1/2 hp blower motor are equipped with three flexible legs and one rigid leg. 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). See Figure 4. 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.

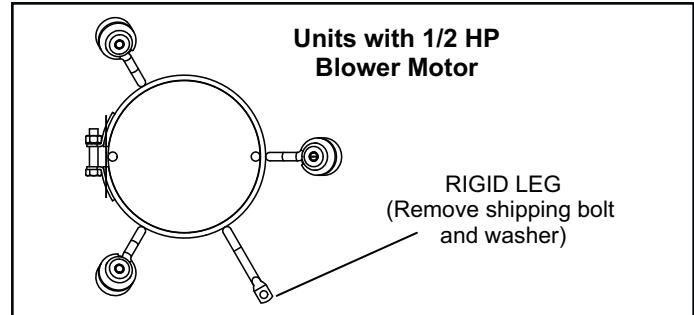


Figure 4.

Installation - Setting Equipment

WARNING
Do not connect the return air duct 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.

WARNING
Blower access panel must be securely in place when 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 air in the living space. Use sheet metal screws and joint tape to seal return air system to furnace.
In platform installations with furnace return, 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.
For no reason should return and supply air duct systems ever 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.

Upflow Applications

The NF97X***V**R gas furnace can be installed as shipped in the upflow position. Refer to Figure 5 for clearances. 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, condensate trap and drain connections, and installation and service clearances [24 inches (610 mm) at unit front]. The unit must be level from side to side. The unit may be positioned from level to 1/2" toward the front. See Figure 6.

Allow for clearances to combustible materials as indicated on the unit nameplate.

Return Air Guidelines

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.

Refer to *Product Specifications* for additional information.

Applications that include side return air and a condensate trap installed on the same side of the cabinet (trap can be installed remotely within 5 ft.) require either a return air base or field-fabricated transition to accommodate an optional IAQ accessory taller than 14.5". See Figure 7.

Top / Plenum	1 in. (25 mm)
* Front	1 in. (25 mm)
Rear	1 in. (25 mm)
Sides	1 in. (25 mm)†
Vent	1 in. (25 mm)
Floor	0 in. ‡
<p>* Front clearance in alcove installation must be 24 in. (610 mm). Maintain a minimum of 24 in. (610 mm) for front service access.</p> <p>† Allow proper clearances to accommodate condensate trap.</p> <p>‡ For installations on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.</p>	

**Figure 5. Installation Clearances
Upflow Applications**

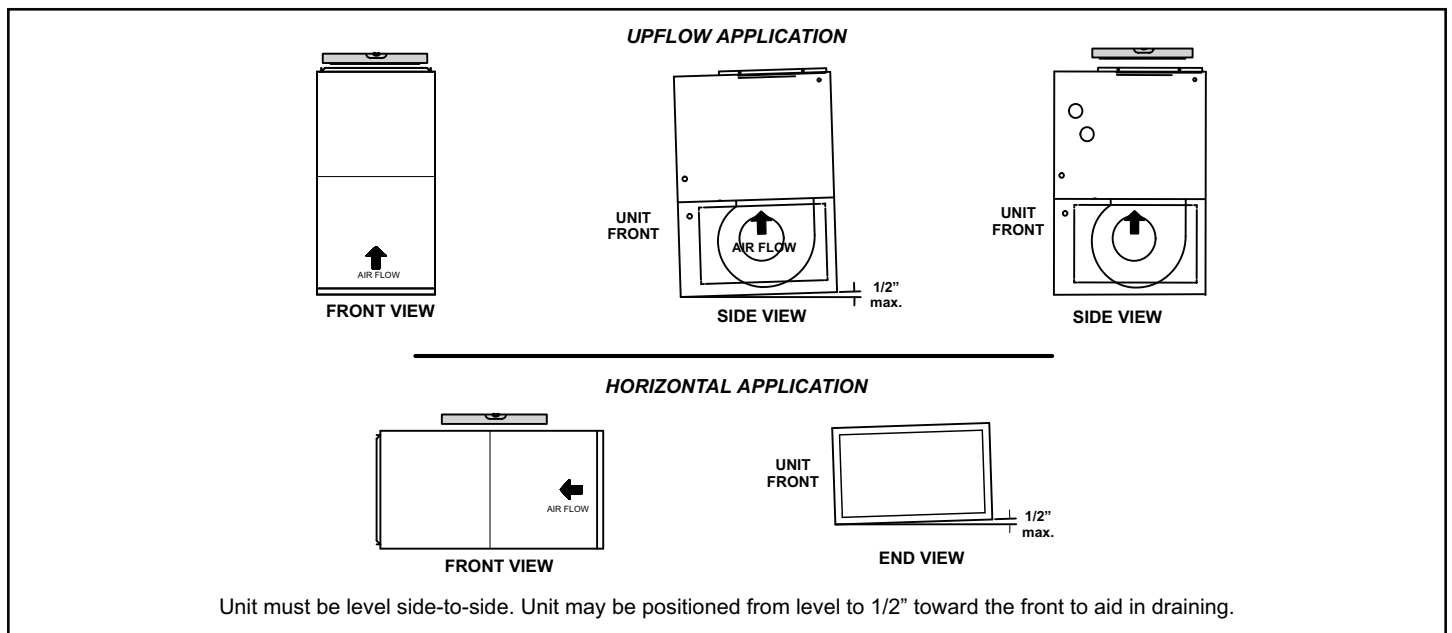


Figure 6. Setting Equipment

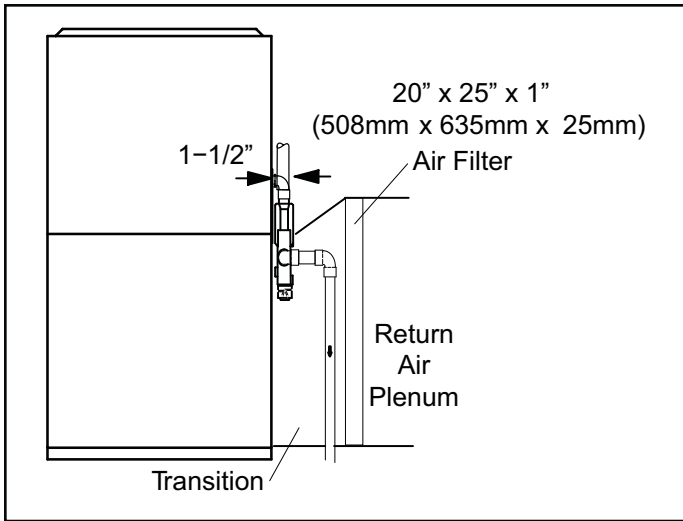


Figure 7. Side Return Air (with transition and filter)

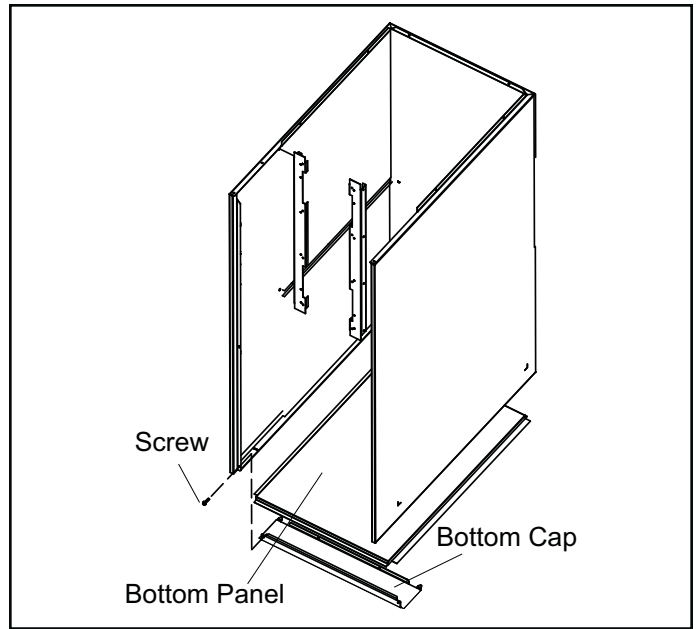
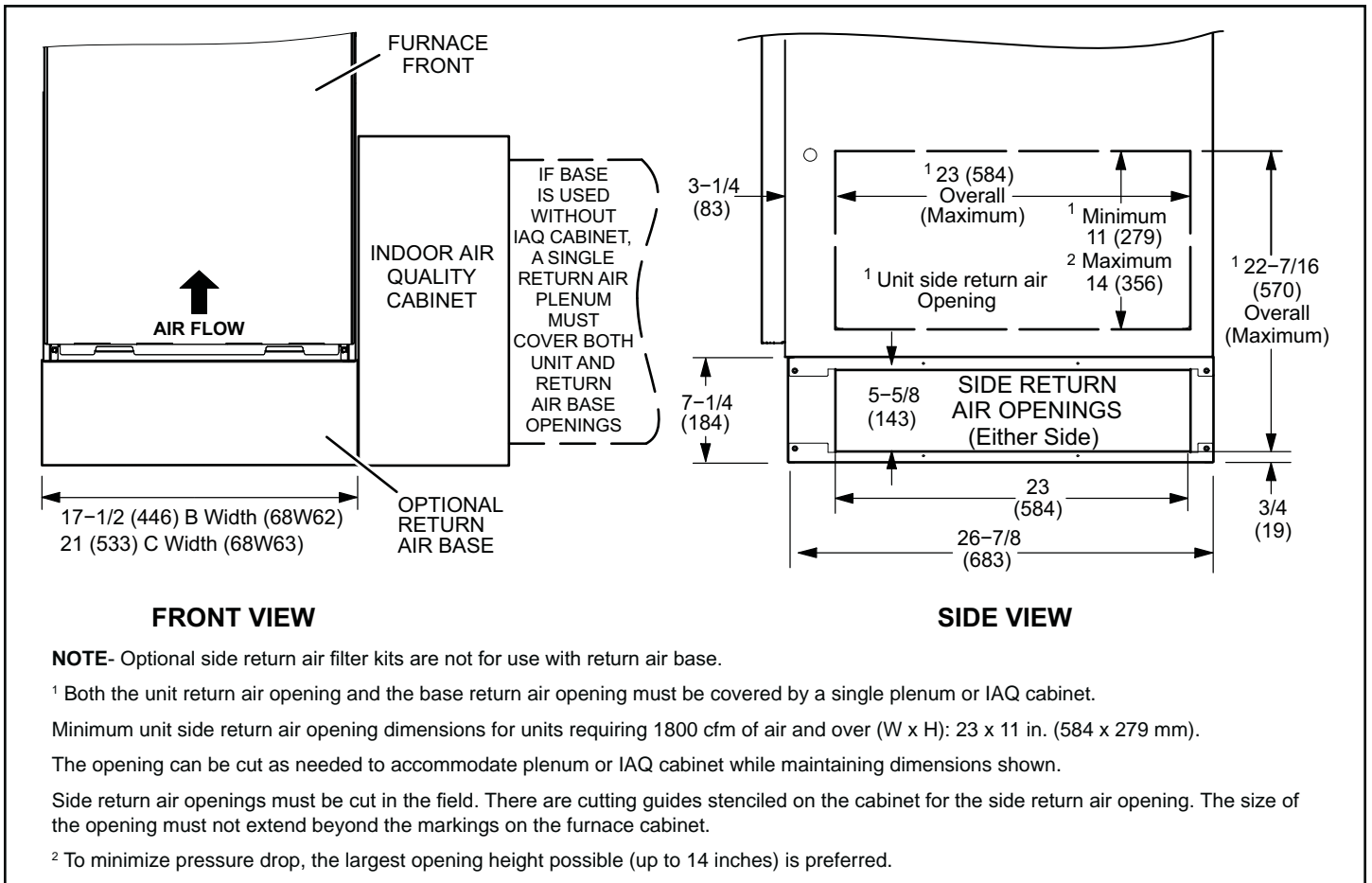


Figure 8. Remove the Bottom Panel



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 8.

Horizontal Applications

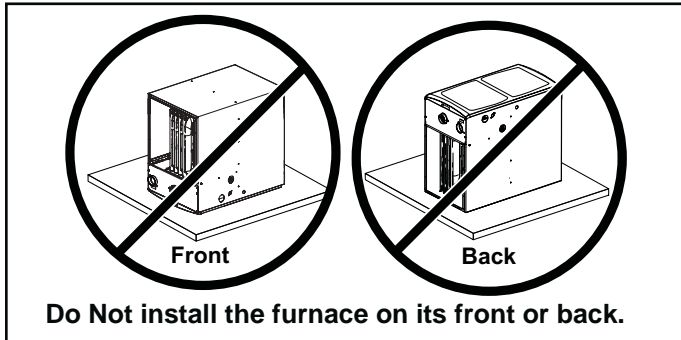


Figure 10. Improper Installations

The NF97X***V**R furnace can be installed in horizontal applications with either right- or left-hand air discharge.

Refer to Figure 11 for clearances in horizontal applications.

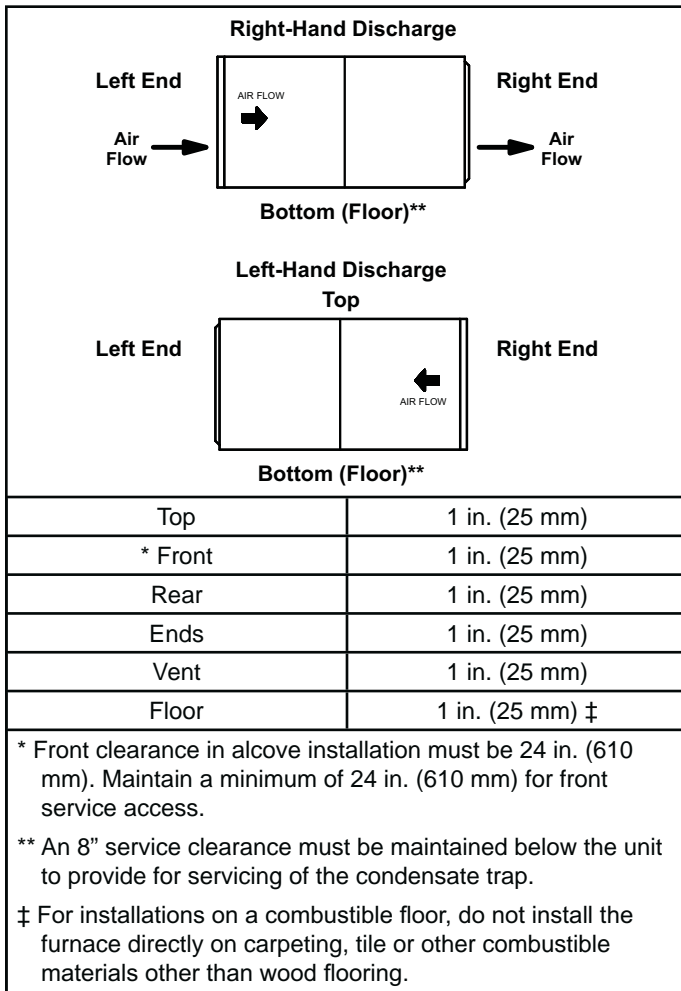


Figure 11. Installation Clearances Horizontal Applications

Suspended Installation of Horizontal Unit

This furnace may be installed in either an attic or a crawlspace. Either suspend the furnace from roof rafters or floor joists, as shown in Figure 12, or install the furnace on a platform, as shown in Figure 13.

NOTE: Heavy-gauge 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.**

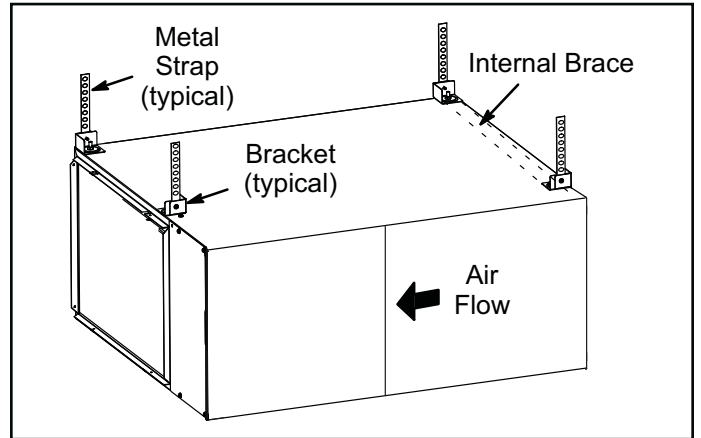


Figure 12. Horizontal Suspension Kit

NOTE: When the furnace is installed on a platform or with the horizontal suspension kit in a crawlspace, it must be elevated enough to avoid water damage, accommodate drain trap and to allow the evaporator coil to drain.

Platform Installation of Horizontal Unit

1. Select location for unit keeping in mind service and other necessary clearances. See Figure 11.
2. Construct a raised wooden frame and cover frame with a plywood sheet. If unit is installed above finished space, install an auxiliary drain pan under unit. Set unit in drain pan as shown in Figure 13. Leave 8 inches for service clearance below unit for condensate trap.
3. Provide a service platform in front of unit. When installing the unit in a crawl space, a proper support platform may be created using cement blocks.
4. Route auxiliary drain line so that water draining from this outlet will be easily noticed by the homeowner.
5. If necessary, run the condensate line into a condensate pump to meet drain line slope requirements. The pump must be rated for use with condensing furnaces. Protect the condensate discharge line from the pump to the outside to avoid freezing.
6. Continue with exhaust, condensate and intake piping installation according to instructions.

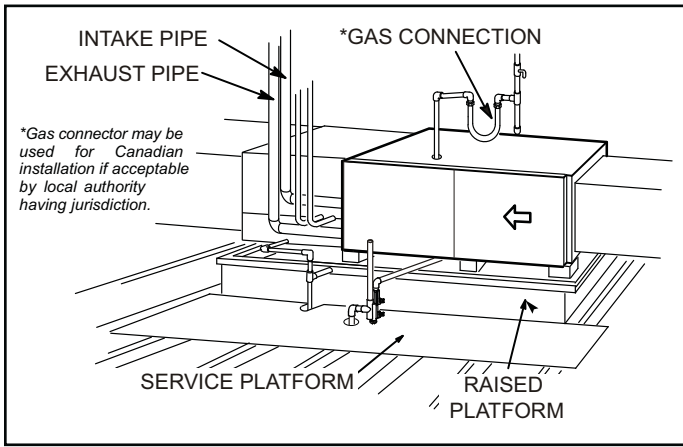


Figure 13. Platform Installation

Return Air -- Horizontal Applications

Return air may be brought in only through the end of a furnace installed in the horizontal position. The furnace is equipped with a removable bottom panel to facilitate installation. See Figure 8.

Filters

This unit is not equipped with a filter or rack. A field-provided high velocity rated filter is required for the unit to operate properly. Table 1 lists recommended filter sizes. A filter must be in place whenever the unit is operating.

Furnace Cabinet Width	Filter Size	
	Side Return	Bottom Return
17-1/2"	16 x 25 x 1 (1)	16 x 25 x 1 (1)
21"		20 x 25 x 1 (1)

Table 1.

IMPORTANT

If a high-efficiency filter is being installed as part of this system to ensure better indoor air quality, the filter must be properly sized. High-efficiency filters have a higher static pressure drop than standard-efficiency glass/foam filters. If the pressure drop is too great, system capacity and performance may be reduced. The pressure drop may also cause the limit to trip more frequently during the winter and the indoor coil to freeze in the summer, resulting in an increase in the number of service calls.

Before using any filter with this system, check the specifications provided by the filter manufacturer against the data given in the appropriate GE Appliances Product Specifications. Additional information is provided in Service and Application Note ACC002 (August 2000).

Duct System

Use industry-approved standards to size and install the supply and return air duct system. Figure 14 shows the correct supply and return duct installation. Refer to ACCA Manual D. This will result in a quiet and low-static system that has uniform air distribution.

NOTE: *This furnace is not certified for operation in heating mode (indoor blower operating at selected heating speed) with an external static pressure which exceeds 0.8 inches w.c. Operation at these conditions may result in improper limit operation.*

Supply Air Plenum

If the furnace is installed without a cooling coil, a removable access panel should be installed in the supply air duct. The access panel should be large enough to permit inspection of the heat exchanger. The furnace access panel must always be in place when the furnace is operating and it must not allow leaks.

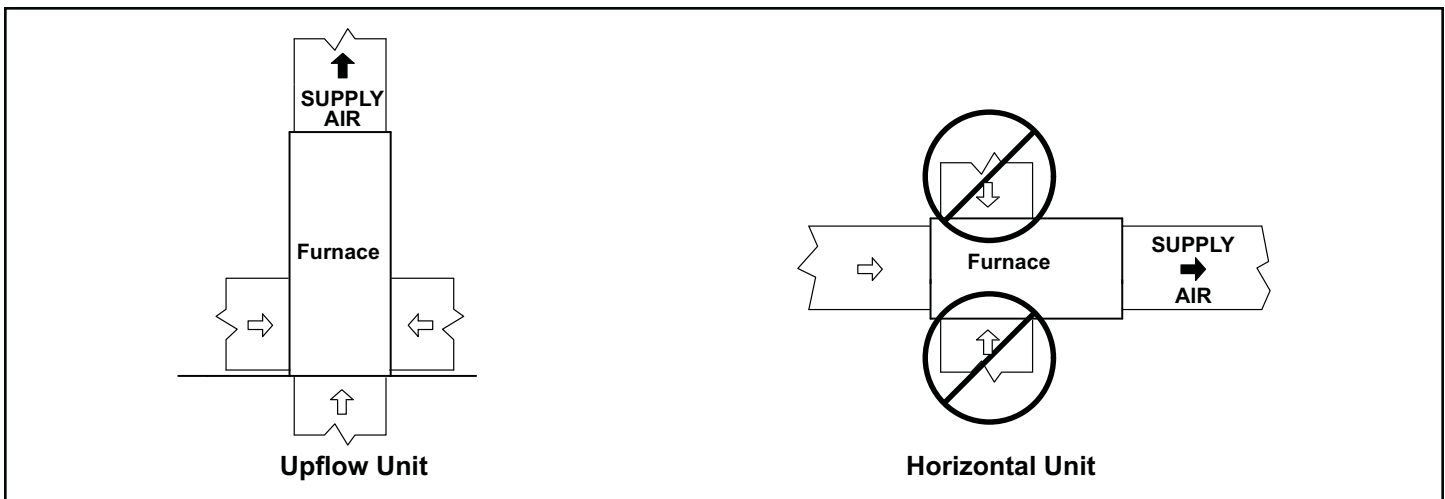


Figure 14. Duct System and Proper Installation

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 raw gas or toxic fumes might then be distributed throughout the house by the furnace duct system.

Return air can be brought in through the bottom or either side of the furnace (return air brought into either side of furnace allowed only in upflow applications). 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.

Pipe & Fittings Specifications

All pipe, fittings, primer and solvent cement must conform with American National Standard Institute and the American Society for Testing and Materials (ANSI/ASTM) standards. The solvent shall be free flowing and contain no lumps, undissolved particles or any foreign matter that adversely affects the joint strength or chemical resistance of the cement. The cement shall show no gelation, stratification, or separation that cannot be removed by stirring. Refer to the Table 2 for approved piping and fitting materials.

CAUTION

Solvent cements for plastic pipe are flammable liquids and should be kept away from all sources of ignition. Do not use excessive amounts of solvent cement when making joints. Good ventilation should be maintained to reduce fire hazard and to minimize breathing of solvent vapors. Avoid contact of cement with skin and eyes.

Schedule 40 PVC (Pipe)	D1785
Schedule 40 PVC (Fittings)	D2466
Schedule 40 CPVC (Pipe)	F441
Schedule 40 CPVC (Fittings)	F438
SDR-21 PVC or SDR-26 PVC (Pipe)	D2241
SDR-21 CPVC or SDR-26 CPVC (Pipe)	F442
Schedule 40 ABS (Pipe)	D1527
Schedule 40 ABS (Fittings)	D2468
ABS-DWV (Drain Waste & Vent) (Pipe & Fittings)	D2661
PVC-DWV (Drain Waste & Vent) Pipe & Fittings)	D2665
PRIMER & SOLVENT CEMENT	ASTM SPECIFICATION
PVC & CPVC Primer	F656
PVC Solvent Cement	D2564
CPVC Solvent Cement	F493
ABS Solvent Cement	D2235
PVC/CPVC/ABS All Purpose Cement For Fittings & Pipe of the same material	D2564, D2235, F493
ABS to PVC or CPVC Transition Solvent Cement	D3138
CANADA PIPE & FITTING & SOLVENT CEMENT	MARKING
PVC & CPVC Pipe and Fittings	ULCS636
PVC & CPVC Solvent Cement	
ABS to PVC or CPVC Transition Cement	
POLYPROPYLENE VENTING SYSTEM	ULC-S636
PolyPro® by Duravent	
InnoFlue® by Centrotherm	
ECCO Polypropylene Vent™	

Table 2. Piping and Fittings Specifications

IMPORTANT

NF97X***V**R exhaust and intake connections are made of PVC. Use PVC primer and solvent cement when using PVC vent pipe. When using ABS vent pipe, use transitional solvent cement to make connections to the PVC fittings in the unit.

Use PVC primer and solvent cement or ABS solvent cement meeting ASTM specifications, refer to Table 2. As an alternate, use all purpose cement, to bond ABS, PVC, or CPVC pipe when using fittings and pipe made of the same materials. Use transition solvent cement when bonding ABS to either PVC or CPVC.

Low temperature solvent cement is recommended during cooler weather. Metal or plastic strapping may be used for vent pipe hangers. Uniformly apply a liberal coat of PVC primer for PVC or use a clean dry cloth for ABS to clean inside socket surface of fitting and male end of pipe to depth of fitting socket.

NOTE: The intake coupling on the furnace is ABS material. Use transitional solvent to make connections to PVC pipe.

NOTE: Exhaust coupling must be installed with provided appliance adapter. See Figure 17.

Joint Cementing Procedure

All cementing of joints should be done according to the specifications outlined in ASTM D 2855.



DANGER OF EXPLOSION!

Fumes from PVC glue may ignite during system check. Allow fumes to dissipate for at least 5 minutes before placing unit into operation.

1. Measure and cut vent pipe to desired length.
2. Debur and chamfer end of pipe, removing any ridges or rough edges. If end is not chamfered, edge of pipe may remove cement from fitting socket and result in a leaking joint.

NOTE: Check the inside of vent pipe thoroughly for any obstruction that may alter furnace operation.

3. Clean and dry surfaces to be joined.
4. Test fit joint and mark depth of fitting on outside of pipe.
5. Uniformly apply a liberal coat of PVC primer for PVC or use a clean dry cloth for ABS to clean inside socket surface of fitting and male end of pipe to depth of fitting socket.

NOTE: Time is critical at this stage. Do not allow primer to dry before applying cement.

6. Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement should be applied lightly but uniformly to inside of socket. Take care to keep excess cement out of socket. Apply second coat to end of pipe.
7. Immediately after applying last coat of cement to pipe, and while both inside socket surface and end of pipe are wet with cement, forcefully insert end of pipe into socket until it bottoms out. Turn PVC pipe 1/4 turn during assembly (but not after pipe is fully inserted) to distribute cement evenly. DO NOT turn ABS or cellular core pipe.

NOTE: Assembly should be completed within 20 seconds after last application of cement. Hammer blows should not be used when inserting pipe.

Capacity	Vent Pipe Dia. (in.)	STANDARD			⁵ CONCENTRIC		
		Outdoor Exhaust Accelerator requirements for field provided terminations		Flush-Mount Kit	1-1/2" Concentric Kit	2" Concentric Kit	3" Concentric Kit
		² Exhaust Accelerator (Dia. X Length)	² Exhaust Accelerator (Dia. X Length)	1 ⁵ 1W11	3 ⁷ 1M80	4 ⁶ 9M29	4 ⁶ 0L46
		1-1/2" X 12"	2" X 12"				
040	2	YES	NO	YES	YES	NO	NO
	3	YES	NO	YES	YES	NO	NO
060	2	YES	NO	YES	YES	NO	NO
	3	YES	NO	YES	YES	NO	NO
080	2	NO	NO	YES	NO	YES	YES
	3	NO	YES	YES	NO	YES	YES

NOTE: ALL KITS MUST BE PROPERLY INSTALLED ACCORDING TO KIT INSTRUCTIONS

1 Flush mount kit 51W11 includes a 1-1/2 " outdoor exhaust accelerator, which is required when used with 040, 060, and 080 input models.

2 Field provided or field fabricated terminations require use of a field provided exhaust accelerator as defined in the table.

3 Concentric kit 71M80 includes a 1-1/2" outdoor accelerator which must be installed on the exhaust outlet when used with 040 and 060 input models.

4 No Accelerator is required for kits 69M29 or 60L46.

5 When the vent/intake diameters are different from the concentric vent kit size, field provided transitions must be used.

Table 3. Outdoor Termination Kits

8. After assembly, wipe excess cement from pipe at end of fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps may indicate an improper assembly due to insufficient solvent.
9. Handle joints carefully until completely set.

Venting Practices

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 53). Any direct vent furnace system is not subject to this requirement.

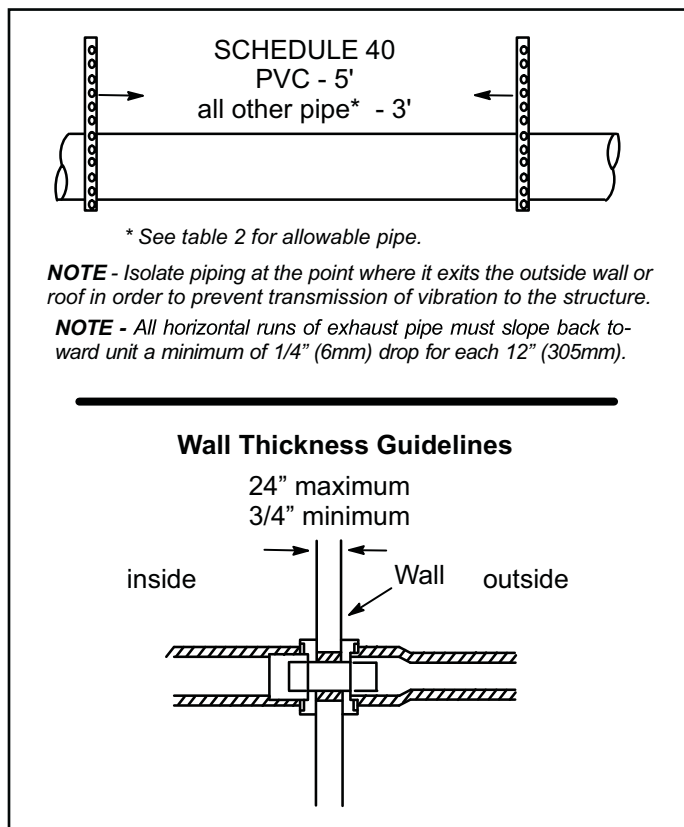


Figure 15. Piping Suspension Guidelines

1. In areas where piping penetrates joists or interior walls, hole must be large enough to allow clearance on all sides of pipe through center of hole using a hanger.
2. When furnace is installed in a residence where unit is shut down for an extended period of time, such as a vacation home, make provisions for draining condensate collection trap and lines.

Removal of the Furnace from Common Vent

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

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

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

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

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

1. Seal any unused openings in the common venting system.
2. Inspect the venting system for proper size and horizontal pitch. Determine that there is no blockage, restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
3. Close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Follow the lighting instructions. Turn on the appliance that is being inspected. Adjust the thermostat so that the appliance operates continuously.
5. After the main burner has 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.

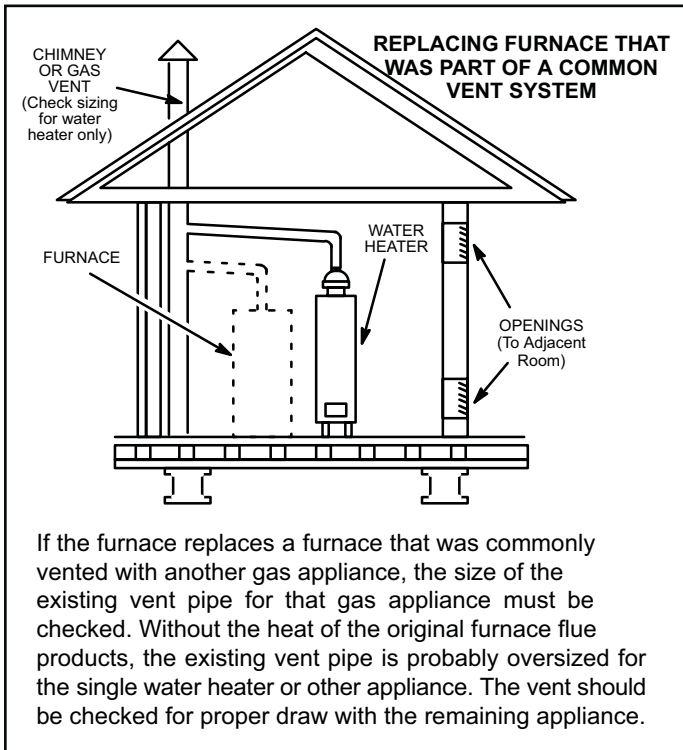


Figure 16.

Exhaust Piping

See Figure 17 through Figure 21

The appliance adaptor must be attached to the exhaust coupling on the furnace top panel. Use the provided straps. See steps below.

1. Remove caution tag from vent adapter.
2. Fully insert vent adapter with both bands loosely attached onto furnace exhaust coupling.
3. Insert PVC exhaust pipe through appliance adapter. Ensure vent pipe is fully seated into exhaust coupling.
4. Tighten both top and bottom bands to 40 in-lbs. See Figure 17.

Route piping to outside of structure. Continue with installation following instructions given in piping termination section.

⚠ CAUTION

The exhaust vent pipe operates under positive pressure and must be completely sealed to prevent leakage of combustion products into the living space.

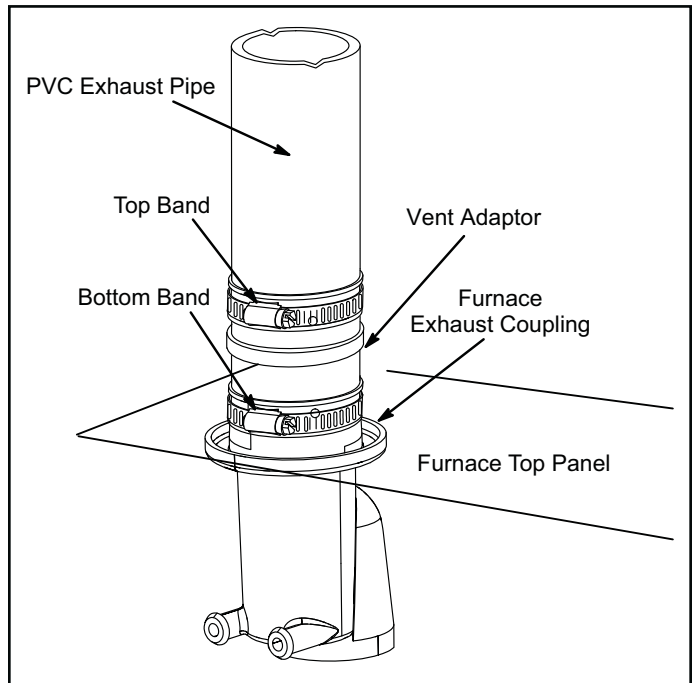


Figure 17. Appliance Adaptor to Exhaust Coupling

Vent Piping Guidelines

GE Appliances has approved the use of DuraVent® and Centrotherm manufactured vent pipe and terminations as an option to PVC. When using the PolyPro® by DuraVent or InnoFlue® by Centrotherm venting system the vent pipe requirements stated in the unit installation instruction – minimum & maximum vent lengths, termination clearances, etc. – apply and must be followed. Follow the instructions provided with PolyPro by DuraVent and InnoFlue by Centrotherm venting system for assembly or if requirements are more restrictive. The PolyPro by DuraVent and InnoFlue by Centrotherm venting system must also follow the uninsulated and unconditioned space criteria listed in Table 7.

The NF97X*V**R is to be installed as a Direct Vent gas central furnace.**

NOTE: In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged outdoors.

Intake and exhaust pipe sizing -- Size pipe according to Table 4 and Table 5A through Table 5D. Count all elbows inside and outside the home. Table 4 lists the minimum vent pipe lengths permitted. Table 5A through Table 5D lists the maximum pipe lengths permitted.

⚠ CAUTION

Do not discharge exhaust into an existing stack or stack that also serves another gas appliance. If vertical discharge through an existing unused stack is required, insert PVC pipe inside the stack until the end is even with the top or outlet end of the metal stack.

Regardless of the diameter of pipe used, the standard roof and wall terminations described in section Exhaust Piping Terminations should be used. Exhaust vent termination pipe is sized to optimize the velocity of the exhaust gas as it exits the termination. Refer to Table 8.

In some applications which permit the use of several different sizes of vent pipe, a combination vent pipe may be used. Contact GE Appliances for assistance in sizing vent pipe in these applications.

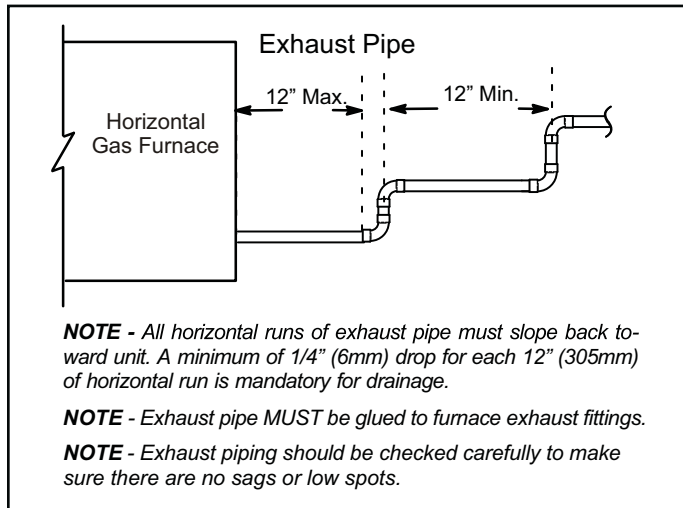


Figure 18. Horizontal Installation Offset Requirements

Model	Min. Vent Length*
040, 060, 080	15 ft. or 5 ft. plus 2 elbows or 10 ft. plus 1 elbow

* Any approved termination may be added to the minimum length listed.

Table 4. Minimum Vent Pipe Lengths

⚠ IMPORTANT

Do not use screens or perforated metal in exhaust or intake terminations. Doing so will cause freeze-ups and may block the terminations.

Use the following steps to correctly size vent pipe diameter.

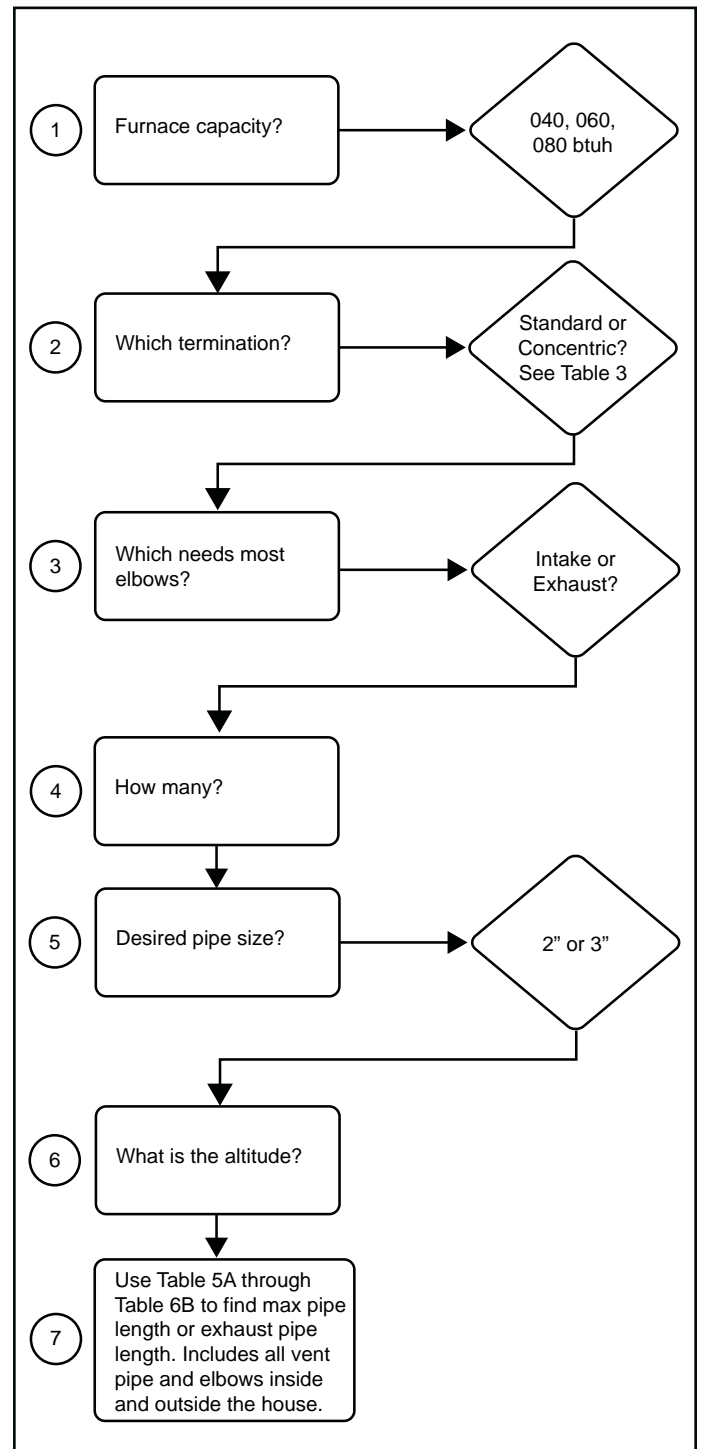


Figure 19.

Maximum Allowable Intake or Exhaust Vent Length in Feet

Standard Termination at Elevation 0 - 4500 ft							
Number of 90° Elbows Used	2" Pipe			3" Pipe			
	Model			Model			
	040	060	080	040	060	080	
1	81	66	44	138	137	118	
2	76	61	39	133	132	113	
3	71	56	34	128	127	108	
4	66	51	29	123	122	103	
5	61	46	24	118	117	98	
6	56	41	19	113	112	93	
7	51	36	14	108	107	88	
8	46	31	n/a	103	102	83	
9	41	26		98	97	78	
10	36	21		93	92	73	
Standard Termination at Elevation 4501 - 6000 ft							
Number of 90° Elbows Used	2" Pipe			3" Pipe			
	Model			Model			
	040	060	080	040	060	080	
1	n/a	41	34	n/a	105	100	
2		36	29		100	95	
3		31	24		95	90	
4		26	19		90	85	
5		21	14		85	80	
6		16	9		80	75	
7		11	n/a		75	70	
8		n/a			n/a	70	65
9						65	60
10		60	55				
<p>NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.</p> <p>NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.</p>							

Table 5A.

Maximum Allowable Intake or Exhaust Vent Length in Feet

Standard Termination at Elevation 6001 - 7500 ft							
Number of 90° Elbows Used	2" Pipe			3" Pipe			
	Model			Model			
	040	060	080	040	060	080	
1	n/a	29	24	n/a	105	100	
2		24	19		100	95	
3		19	14		95	90	
4		14	9		90	85	
5		9	n/a		85	80	
6		n/a			n/a	80	75
7						75	70
8						70	65
9						65	60
10			60			55	

NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.

NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.

Table 5B.

Maximum Allowable Intake or Exhaust Vent Length in Feet

Concentric Termination at Elevation 0 - 4500 ft						
Number of 90° Elbows Used	2" Pipe			3" Pipe		
	Model			Model		
	040	060	080	040	060	080
1	73	58	42	121	121	114
2	68	53	37	116	116	109
3	63	48	32	111	111	104
4	58	43	27	106	106	99
5	53	38	22	101	101	94
6	48	33	17	96	96	89
7	43	28	12	91	91	84
8	38	23	n/a	86	86	79
9	33	18		81	81	74
10	28	13		76	76	69
Concentric Termination at Elevation 4501 - 6000 ft						
Number of 90° Elbows Used	2" Pipe			3" Pipe		
	Model			Model		
	040	060	080	040	060	080
1	n/a	33	32	n/a	89	89
2		28	27		84	84
3		23	22		79	79
4		18	17		74	74
5		13	12		69	69
6	n/a	n/a	n/a	n/a	64	64
7					59	59
8					54	54
9					49	49
10					44	44

NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.

NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.

Table 5C.

Maximum Allowable Intake or Exhaust Vent Length in Feet

Concentric Termination at Elevation 6001 - 7500 ft							
Number of 90° Elbows Used	2" Pipe			3" Pipe			
	Model			Model			
	040	060	080	040	060	080	
1	n/a	27	22	n/a	89	89	
2		22	17		84	84	
3		17	12		79	79	
4		12	7		74	74	
5		7	n/a		69	69	
6		n/a			n/a	64	64
7						59	59
8						54	54
9						49	49
10			44			44	

NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.

NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.

Table 5D.

Maximum Allowable Exhaust Vent Lengths With Furnace Installed in a Closet or Basement Using Ventilated Attic or Crawl Space For Intake Air in Feet

Standard Termination at Elevation 0 - 4500 ft						
Number of 90° Elbows Used	2" Pipe			3" Pipe		
	Model			Model		
	040	060	080	040	060	080
1	71	56	34	118	117	98
2	66	51	29	113	112	93
3	61	46	24	108	107	88
4	56	41	19	103	102	83
5	51	36	14	98	97	78
6	46	31	9	93	92	73
7	41	26	4	88	87	68
8	36	21	n/a	83	82	63
9	31	16		78	77	58
10	26	11		73	72	53
Standard Termination at Elevation 4501 - 6000 ft						
Number of 90° Elbows Used	2" Pipe			3" Pipe		
	Model			Model		
	040	060	080	040	060	080
1	n/a	31	24	n/a	85	80
2		26	19		80	75
3		21	14		75	70
4		16	9		70	65
5		11	n/a		65	60
6	n/a	n/a		60	55	
7				55	50	
8				50	45	
9				45	40	
10			40	35		
<p>NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.</p> <p>NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.</p>						

Table 6A.

Maximum Allowable Exhaust Vent Lengths With Furnace Installed in a Closet or Basement Using Ventilated Attic or Crawl Space For Intake Air in Feet

Standard Termination at Elevation 6001 - 7500 ft						
Number of 90° Elbows Used	2" Pipe			3" Pipe		
	Model			Model		
	040	060	080	040	060	080
1	n/a	19	14	n/a	85	80
2		14	9		80	75
3		9			75	70
4					70	65
5					65	60
6					60	55
7			n/a		55	50
8					50	45
9					45	40
10					40	35

NOTE - Size intake and exhaust pipe length separately. Values in table are for Intake OR Exhaust, not combined total. Both Intake and Exhaust must be same pipe size.

NOTE - Additional vent pipe and elbows used to terminate the vent pipe outside the structure must be included in the total vent length calculation.

Table 6B.

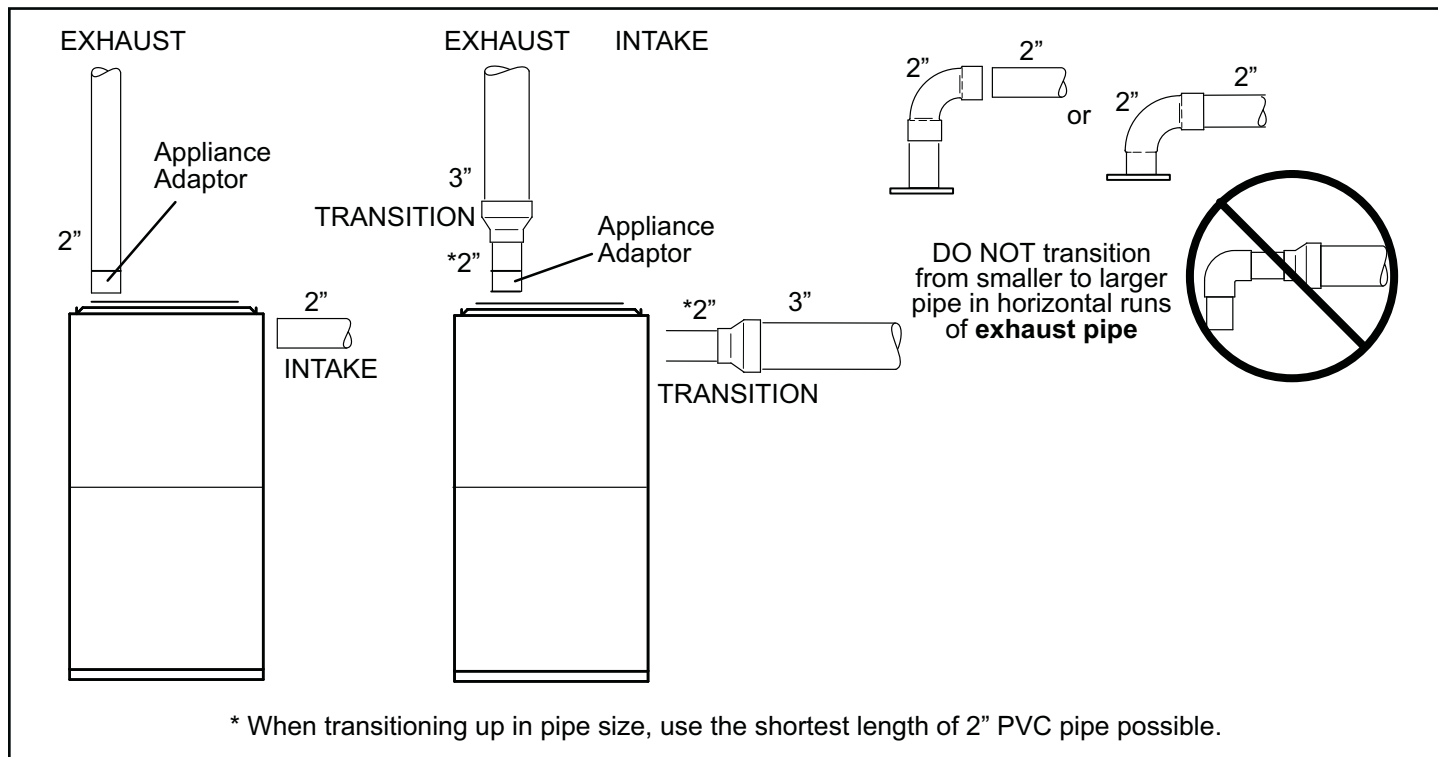


Figure 20. Typical Exhaust and Intake Pipe Connections in Upflow Direct Vent Applications

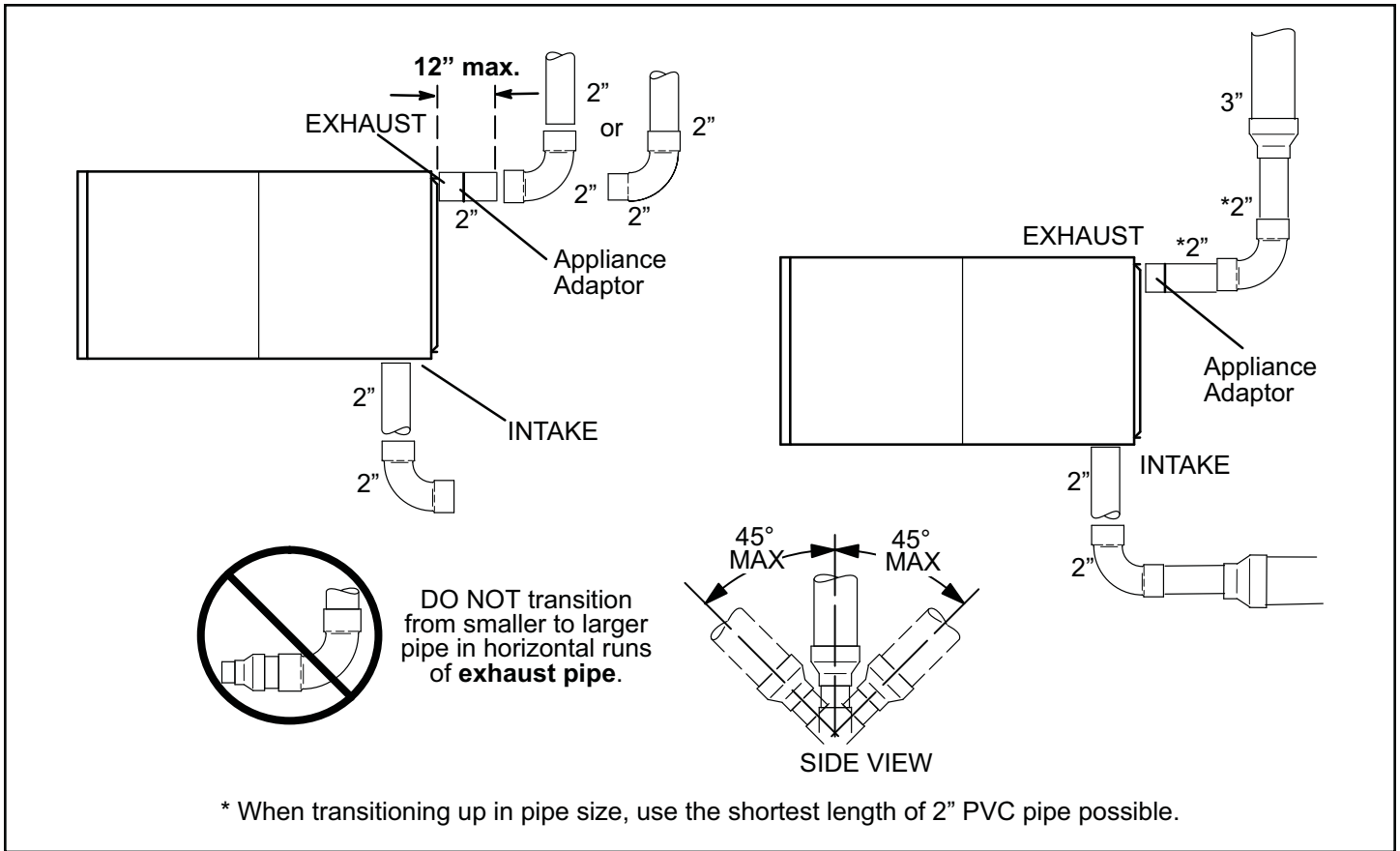


Figure 21. Typical Exhaust and Intake Pipe Connections in Horizontal Direct Vent Applications (Right Hand Discharge Shown)

General Guidelines for Vent Terminations

In Direct Vent applications, combustion air is taken from outdoors and the flue gases are discharged to the outdoors. The NF97X***V**R is then classified as a direct vent, Category IV gas furnace.

In Direct Vent applications, the vent termination is limited by local building codes. In the absence of local codes, refer to the current National Fuel Gas Code ANSI Z223-1/NFPA 54 in U.S.A..

Position termination according to location given in Figure 23. In addition, position termination so it is free from any obstructions and 12" above the average snow accumulation.

At vent termination, care must be taken to maintain protective coatings over building materials (prolonged exposure to exhaust condensate can destroy protective coatings). It is recommended that the exhaust outlet not be located within 6 feet (1.8m) of an outdoor AC unit because the condensate can damage the painted coating.

NOTE: See Table 7 for maximum allowed exhaust pipe length without insulation in unconditioned space during winter design temperatures below 32°F (0°C). If required exhaust pipe should be insulated with 1/2" (13mm) ArmaFlex® or equivalent. In extreme cold climate areas, 3/4" (19mm) ArmaFlex® or equivalent may be necessary. Insulation must be protected from deterioration. ArmaFlex® with UV protection is permissible. Basements or other enclosed areas that are not exposed to the outdoor ambient temperature and are above 32°F (0°C) are to be considered conditioned spaces.

⚠ IMPORTANT

Do not use screens or perforated metal in exhaust or intake terminations. Doing so will cause freeze-ups and may block the terminations.

Maximum Allowable Exhaust Vent Pipe Length (in ft.) without Insulation in Unconditioned Space for Winter Design Temperatures							
Winter Design Temperatures ¹ °F (°C)	Vent Pipe Diameter	Unit Input Size					
		040		060		080	
		PVC	² PP	PVC	² PP	PVC	² PP
32 to 21 (0 to -6)	2 in.	21	18	33	30	46	42
	3 in.	12	12	21	21	30	30
20 to 1 (-7 to -17)	2 in.	11	9	19	17	28	25
	3 in.	N/A	N/A	9	9	16	16
0 to -20 (-18 to -29)	2 in.	6	4	12	10	19	16
	3 in.	N/A	N/A	N/A	N/A	8	8

¹ Refer to 99% Minimum Design Temperature table provided in the current edition of the ASHRAE Fundamentals Handbook.

² Poly-Propylene vent pipe (PP) by Duravent and Centrotherm

NOTE - Concentric terminations are the equivalent of 5' and should be considered when measuring pipe length.

NOTE- Maximum uninsulated vent lengths listed may include the termination (vent pipe exterior to the structure) and cannot exceed 5 linear feet or the maximum allowable intake or exhaust vent length listed in Table 5A through Table 5D, or Table 6A through Table 6B, whichever is less.

NOTE - If insulation is required in an unconditioned space, it must be located on the pipe closest to the furnace. See Figure 22.

Table 7.

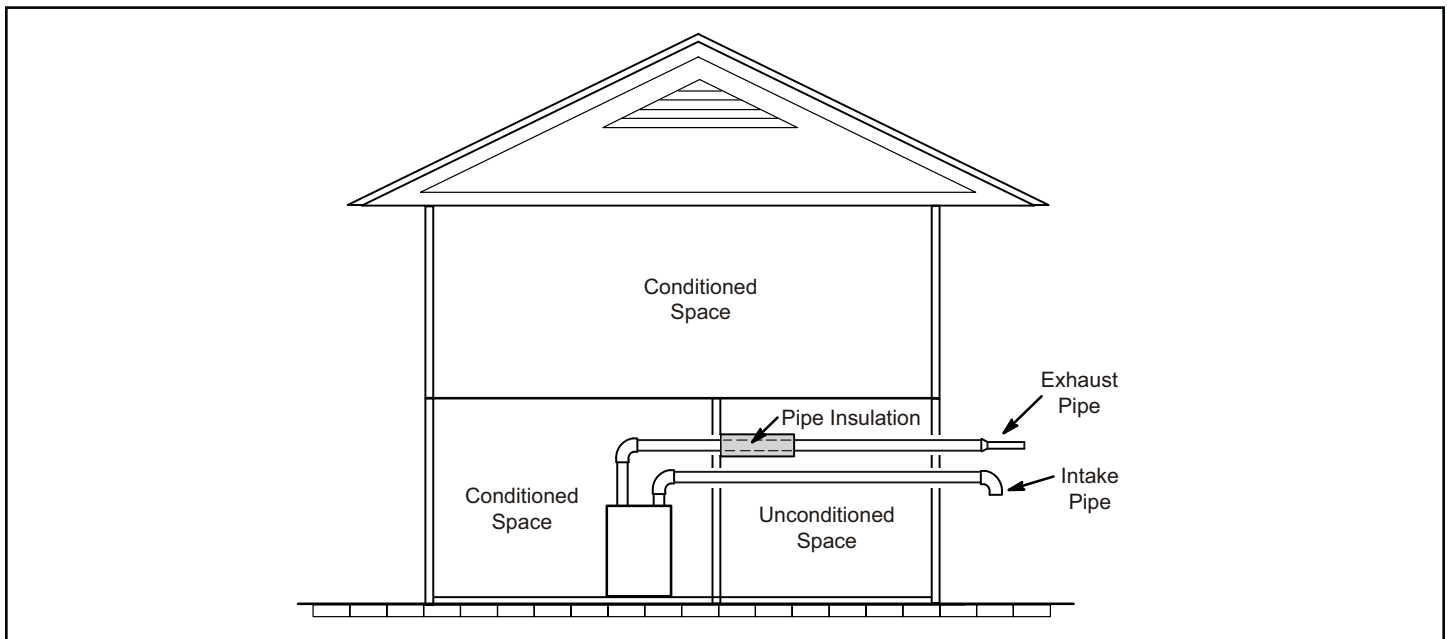
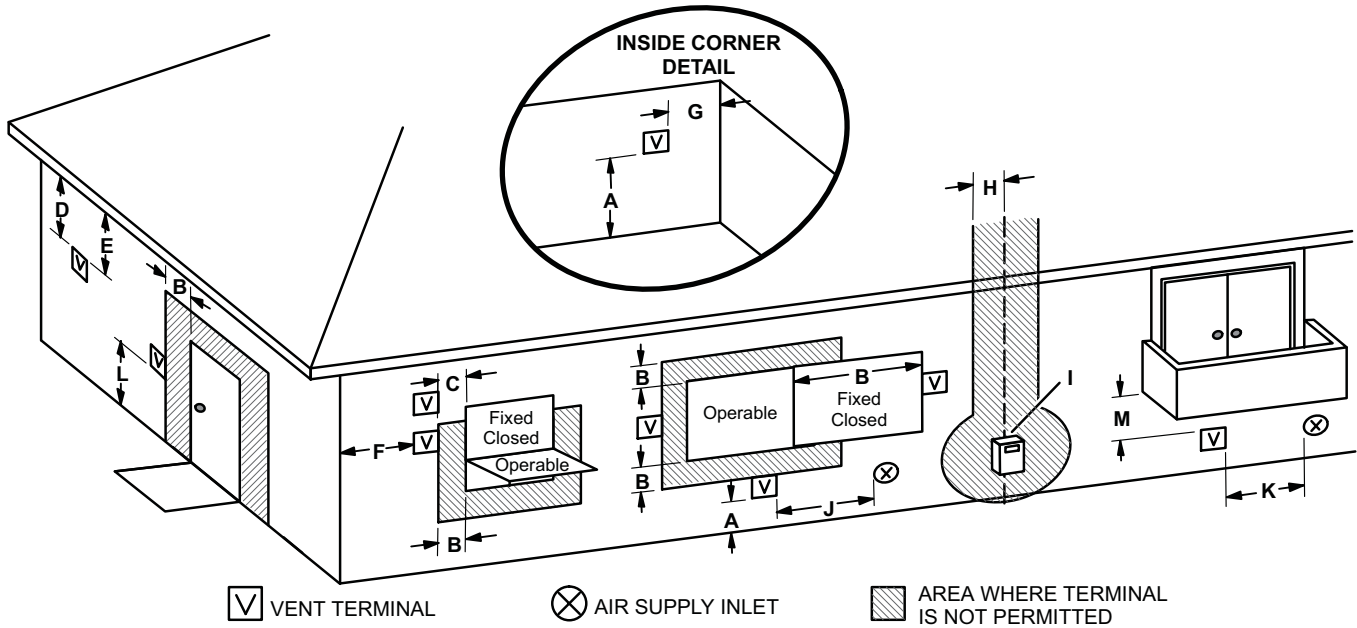


Figure 22. Insulating Exhaust Pipe in an Unconditioned Space

VENT TERMINATION CLEARANCES FOR DIRECT VENT INSTALLATIONS IN THE USA AND CANADA



	US Installations ¹	Canadian Installations ²	
A =	Clearance above grade, veranda, porch, deck or balcony	12 inches (305mm) or 12 inches (305mm) above average snow accumulation.	12 inches (305mm) or 12 inches (305mm) above average snow accumulation.
B =	Clearance to window or door that may be opened	6 inches (152mm) for appliances <10,000 Btuh (3kw), 9 inches (228mm) for appliances > 10,000 Btuh (3kw) and <50,000 Btuh (15kw), 12 inches (305mm) for appliances > 50,000 Btuh (15kw)	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
C =	Clearance to permanently closed window	* 12"	* 12"
D =	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (610mm) from the center line of the terminal	* Equal to or greater than soffit depth	* Equal to or greater than soffit depth
E =	Clearance to unventilated soffit	* Equal to or greater than soffit depth	* Equal to or greater than soffit depth
F =	Clearance to outside corner	* No minimum to outside corner	* No minimum to outside corner
G =	Clearance to inside corner	*	*
H =	Clearance to each side of center line extended above meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly
I =	Clearance to service regulator vent outlet	* 3 feet (.9m)	3 feet (.9m)
J =	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (152mm) for appliances <10,000 Btuh (3kw), 9 inches (228mm) for appliances > 10,000 Btuh (3kw) and <50,000 Btuh (15kw), 12 inches (305mm) for appliances > 50,000 Btuh (15kw)	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
K =	Clearance to mechanical air supply inlet	3 feet (.9m) above if within 10 feet (3m) horizontally	6 feet (1.8m)
L =	Clearance above paved sidewalk or paved driveway located on public property	* 7 feet (2.1m)	7 feet (2.1m)†
M =	Clearance under veranda, porch, deck or balcony	*12 inches (305mm)‡	12 inches (305mm)‡

¹ In accordance with the current ANSI Z223.1/NFPA 54 Natural Fuel Gas Code
² In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code
 † A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.
 ‡ Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor. Avoiding this location is recommended if possible.

*For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, clearance will be in accordance with local installation codes and the requirements of the gas supplier and these installation instructions."

NOTE - This figure is intended to illustrate clearance requirements and does not serve as a substitute for locally adopted installation codes.

Figure 23.

Details of Intake and Exhaust Piping Terminations for Direct Vent Installations

NOTE: In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged to outdoors.

NOTE: Flue gas may be slightly acidic and may adversely affect some building materials. If any vent termination is used and the flue gasses may impinge on the building material, a corrosion-resistant shield (minimum 24 inches square) should be used to protect the wall surface. If the optional tee is used, the protective shield is recommended. The shield should be constructed using wood, plastic, sheet metal or other suitable material. All seams, joints, cracks, etc. in the affected area should be sealed using an appropriate sealant. See Figure 32.

Intake and exhaust pipes may be routed either horizontally through an outside wall or vertically through the roof. In attic or closet installations, vertical termination through the roof is preferred. Figure 24 through Figure 31 show typical terminations.

1. Intake and exhaust terminations are not required to be in the same pressure zone. You may exit the intake on one side of the structure and the exhaust on another side (Figure 25). You may exit the exhaust out the roof and the intake out the side of the structure (Figure 26).
2. Intake and exhaust pipes should be placed as close together as possible at termination end (refer to illustrations). Minimum separation is 3" (76MM) on roof terminations and 6" (152MM) on side wall terminations.

NOTE: When venting in different pressure zones, the maximum separation requirement of intake and exhaust pipe DOES NOT apply.

3. On roof terminations, the intake piping should terminate straight down using two 90° elbows (Figure 24).
4. Exhaust piping must terminate straight out or up as shown. A reducer may be required on the exhaust piping at the point where it exits the structure to improve the velocity of exhaust away from the intake piping. See Table 8.

NOTE: Care must be taken to avoid recirculation of exhaust back into intake pipe.

5. On field-supplied terminations for side wall exit, exhaust piping may extend a maximum of 12 inches (305MM) for 2" PVC and 20 inches (508MM) for 3" (76MM) PVC beyond the outside wall. Intake piping should be as short as possible. See Figure 32.
6. On field-supplied terminations, a minimum distance between the end of the exhaust pipe and the end of the intake pipe without a termination elbow is 8" and a minimum distance of 6" with a termination elbow. See Figure 32.
7. If intake and exhaust piping must be run up a side wall to position above snow accumulation or other obstructions, piping must be supported. At least one

bracket must be used within 6" from the top of the elbow and then every 24" (610mm) as shown in Figure 32, to prevent any movement in any direction. When exhaust and intake piping must be run up an outside wall, the exhaust piping must be terminated with pipe sized per Table 8. The intake piping may be equipped with a 90° elbow turndown. Using turndown will add 5 feet (1.5m) to the equivalent length of the pipe.

8. A multiple furnace installation may use a group of up to four terminations assembled together horizontally, as shown in Figure 30.

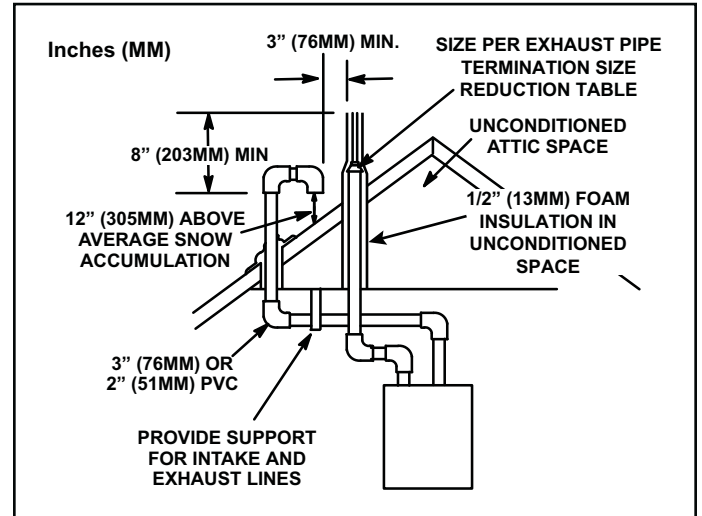


Figure 24. Direct Vent Roof Termination

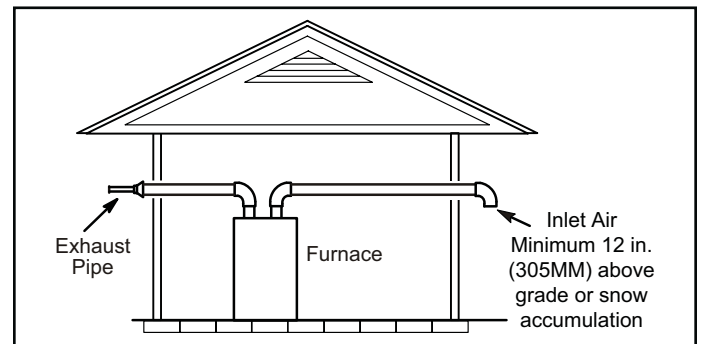


Figure 25. Exiting Exhaust and Intake Vent (no common pressure zone)

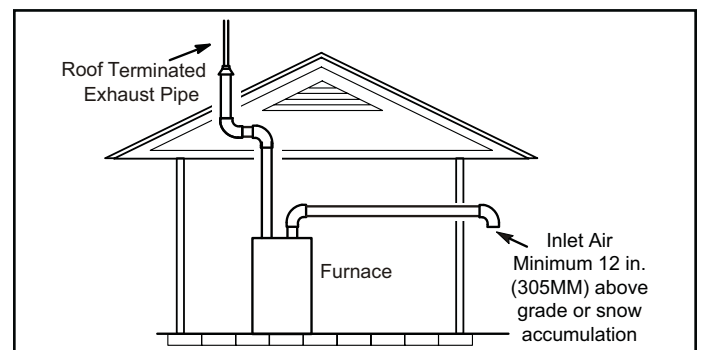


Figure 26. Exiting Exhaust and Intake Vent (no common pressure zone)

Model	Termination Pipe Size
040 and 060	1-1/2" (38 mm)
080	2" (51 mm)

* Units with the flush mount termination must use the 1-1/2" accelerator supplied with the kit

Table 8. Exhaust Pipe Termination Size Reduction

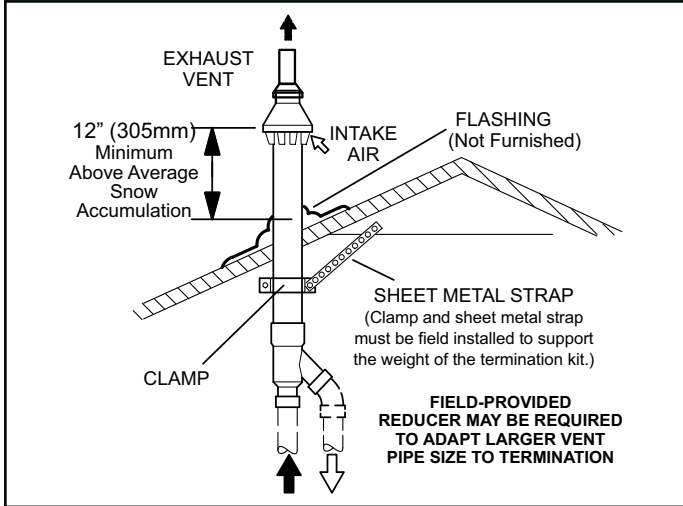


Figure 27. Direct Vent Concentric Rooftop Termination
71M80, 69M29 or 60L46 (US)

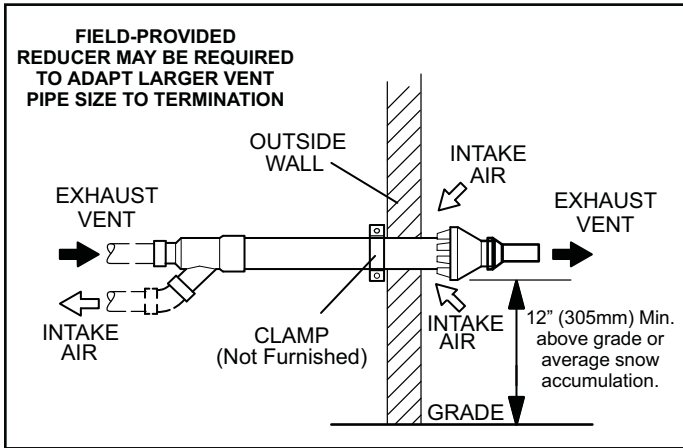


Figure 28. Direct Vent Concentric Wall Termination
71M80, 69M29 or 60L46 (US)

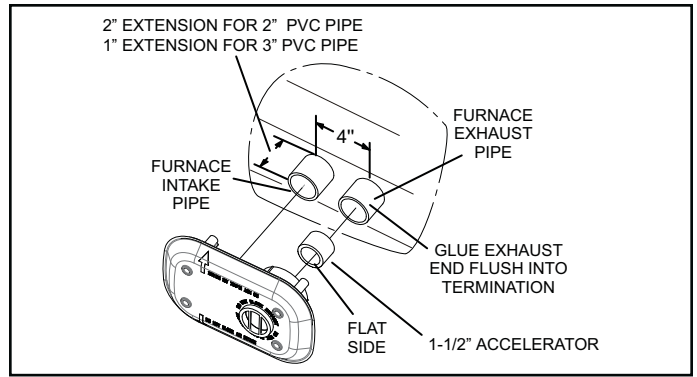


Figure 29. Flush-Mount Side Wall Termination 51W11

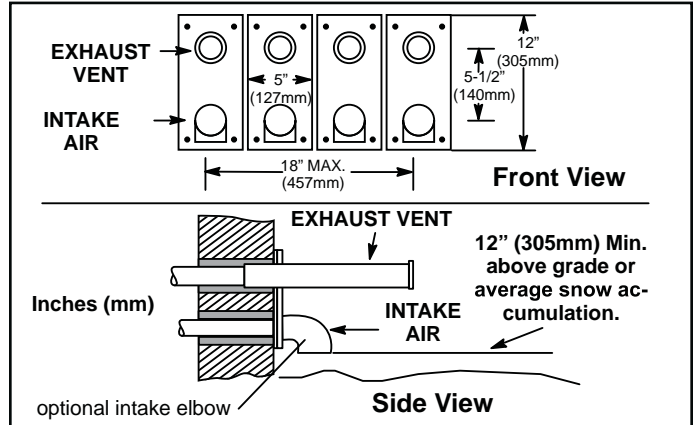
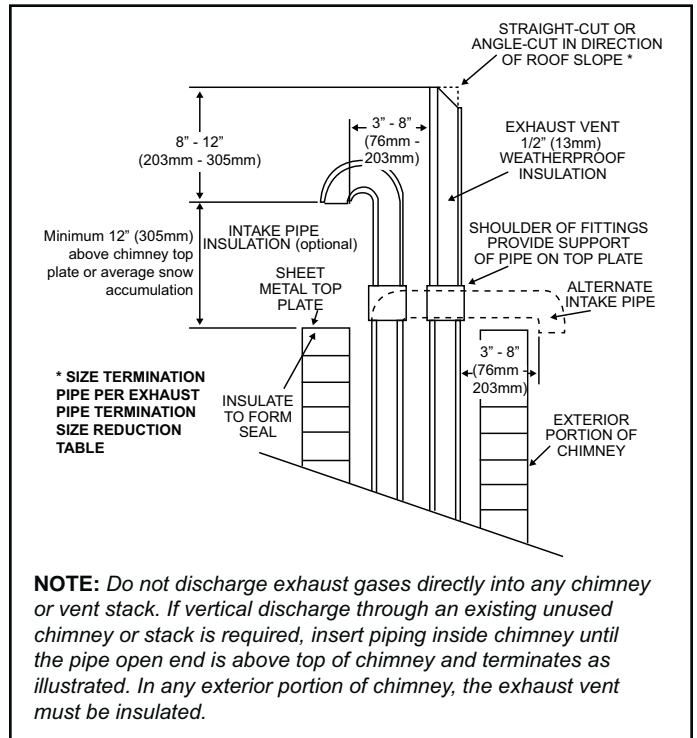


Figure 30. Optional Vent Termination for Multiple Unit Installation of Direct Vent Wall Termination

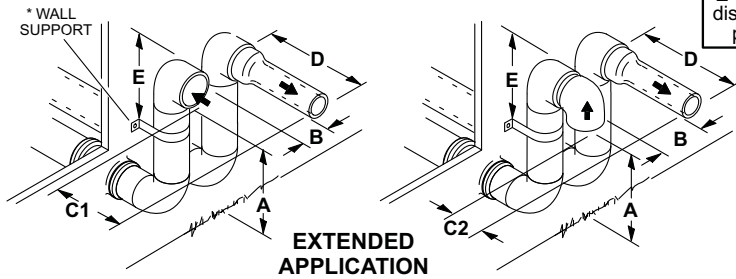
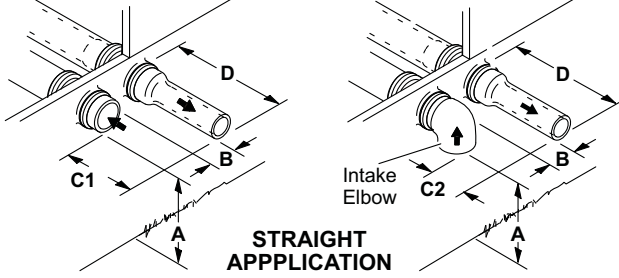


NOTE: Do not discharge exhaust gases directly into any chimney or vent stack. If vertical discharge through an existing unused chimney or stack is required, insert piping inside chimney until the pipe open end is above top of chimney and terminates as illustrated. In any exterior portion of chimney, the exhaust vent must be insulated.

Figure 31. Direct Vent Application Using Existing Chimney

FIELD FABRICATED WALL TERMINATION

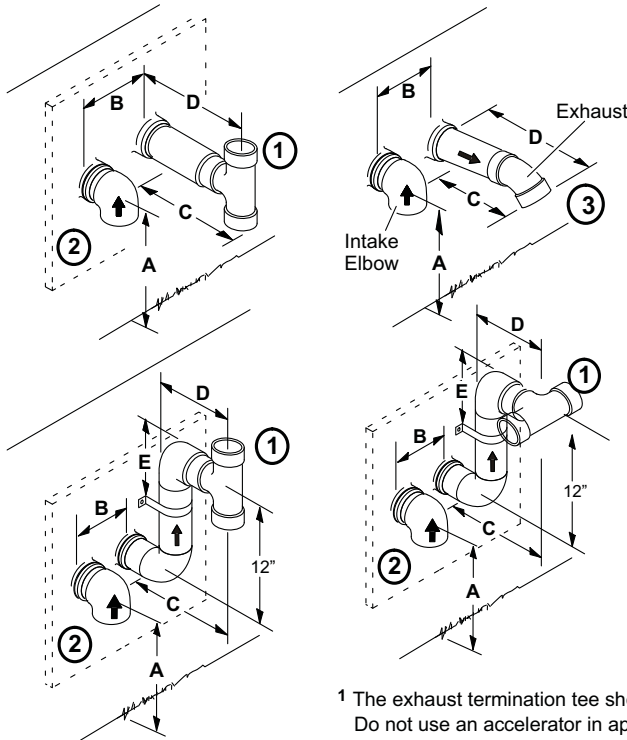
NOTE - FIELD-PROVIDED REDUCER MAY BE REQUIRED TO ADAPT LARGER VENT PIPE SIZE TO TERMINATION



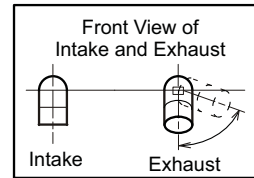
	2" (51mm) Vent Pipe	3" (76mm) Vent Pipe
A - Minimum clearance above grade or average snow accumulation	12" (305 mm)	12" (305 mm)
B - Maximum horizontal separation between intake and exhaust	6" (152 mm)	6" (152 mm)
C1 -Minimum from end of exhaust to inlet of intake	8" (203 mm)	8" (203 mm)
C2 -Minimum from end of exhaust to inlet of intake	6" (152 mm)	6" (152 mm)
D - Maximum exhaust pipe length	12" (305 mm)	20" (508 mm)
E - Maximum wall support distance from top of each pipe (intake/exhaust)	6" (152 mm)	6" (152 mm)

* Use wall support every 24" (610 mm). Use two wall supports if extension is greater than 24" (610 mm) but less than 48" (1219 mm).
NOTE - One wall support must be within 6" (152 mm) from top of each pipe (intake and exhaust) to prevent movement in any direction.

ALTERNATE TERMINATIONS (TEE & FORTY-FIVE DEGREE ELBOWS ONLY)



	2" (51MM) Vent Pipe	3" (76MM) Vent Pipe
A - Clearance above grade or average snow accumulation	12" (305 mm) Min.	12" (305 mm) Min.
B - Horizontal separation between intake and exhaust	6" (152 mm) Min. 24" (610 mm) Max.	6" (152 mm) Min. 24" (610 mm) Max.
C - Minimum from end of exhaust to inlet of intake	9" (227 mm) Min.	9" (227 mm) Min.
D - Exhaust pipe length	12" (305 mm) Min. 16" (405 mm) Max.	12" (305 mm) Min. 20" (508 mm) Max.
E - Wall support distance from top of each pipe (intake/exhaust)	6" (152 mm) Max.	6" (152 mm) Max.



- 1 The exhaust termination tee should be connected to the 2" or 3" PVC flue pipe as shown in the illustration. Do not use an accelerator in applications that include an exhaust termination tee. The accelerator is not required.
- 2 As required. Flue gas may be acidic and may adversely affect some building materials. If a side wall vent termination is used and flue gases will impinge on the building materials, a corrosion-resistant shield (24 inches square) should be used to protect the wall surface. If optional tee is used, the protective shield is recommended. The shield should be constructed using wood, sheet metal or other suitable material. All seams, joints, cracks, etc. in affected area, should be sealed using an appropriate sealant.
- 3 Exhaust pipe 45° elbow can be rotated to the side away from the combustion air inlet to direct exhaust away from adjacent property. The exhaust must never be directed toward the combustion air inlet.

Figure 32.

Condensate Piping

This unit is designed for either right- or left-side exit of condensate piping in upflow applications. In horizontal applications, the condensate trap must extend below the unit. An 8" service clearance is required for the condensate trap. Refer to Figure 33 and Figure 35 for condensate trap locations. Figure 41 shows trap assembly using 1/2" PVC or 3/4" PVC.

NOTE: If necessary the condensate trap may be installed up to 5' away from the furnace. Use PVC pipe to connect trap to furnace condensate outlet. Piping from furnace must slope down a minimum of 1/4" per ft. toward trap.

1. Determine which side condensate piping will exit the unit, location of trap, field-provided fittings and length of PVC pipe required to reach available drain.
2. Use a large flat head screw driver or a 1/2" drive socket extension and remove plug (Figure 33) from the cold end header box at the appropriate location on the side of the unit. Install provided 3/4 NPT street elbow fitting into cold end header box. Use Teflon tape or appropriate pipe dope.
3. Install the cap over the clean out opening at the base of the trap. Secure with clamp. See Figure 41.
4. Install drain trap using appropriate PVC fittings, glue all joints. Glue the provided drain trap as shown in Figure 41. Route the condensate line to an open drain. Condensate line must maintain a 1/4" downward slope from the furnace to the drain.
5. Figure 36 and Figure 37 show the furnace and evaporator coil using a separate drain. If necessary the condensate line from the furnace and evaporator coil can drain together. See Figure 38 through Figure 40.

Upflow furnace (Figure 39) - In upflow furnace applications the field provided vent must be a minimum 1" to a maximum 2" length above the condensate drain outlet connection. Any length above 2" may result in a flooded heat exchanger if the combined primary drain line were to become restricted.

Horizontal furnace (Figure 40) - In horizontal furnace applications the field provided vent must be a minimum 4" to a maximum 5" length above the condensate drain outlet connection. Any length above 5" may result in a flooded heat exchanger if the combined primary drain line were to become restricted.

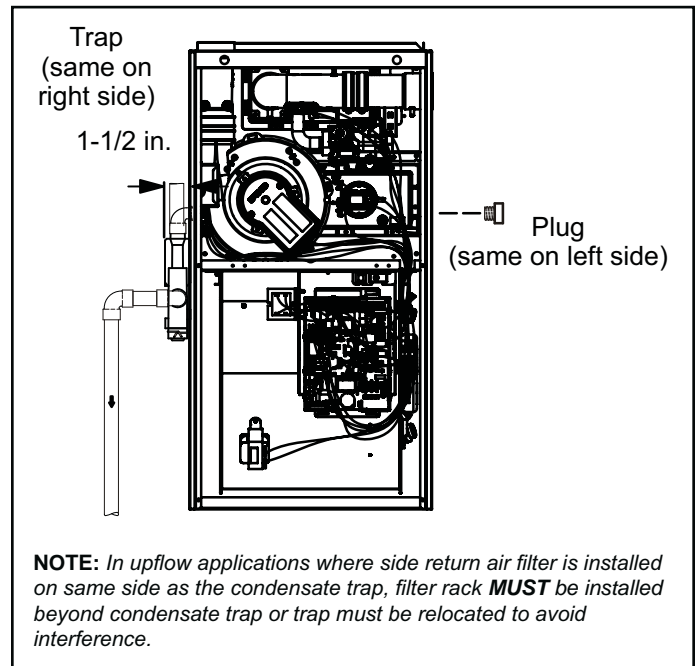


Figure 33. Condensate Trap and Plug Locations (unit shown in upflow position)

NOTE: In horizontal applications it is recommended to install a secondary drain pan underneath the unit and trap assembly.

NOTE: Appropriately sized tubing and barbed fitting may be used for condensate drain. Attach to the drain on the trap using a hose clamp. See Figure 34.

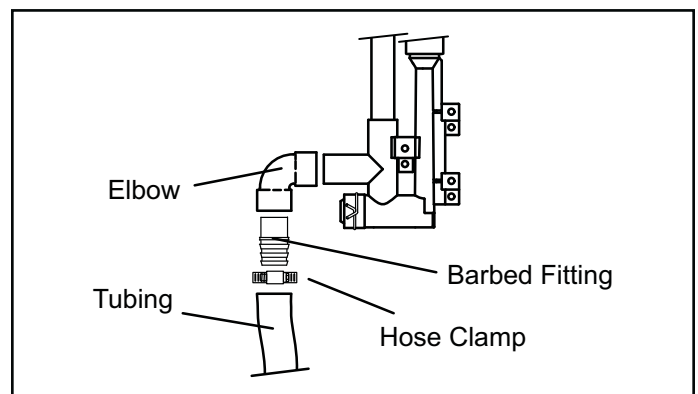


Figure 34. Field-Provided Drain Components

CAUTION

Do not use copper tubing or existing copper condensate lines for drain line.

6. If unit will be started immediately upon completion of installation, prime trap per procedure outlined in Unit Start-Up section.

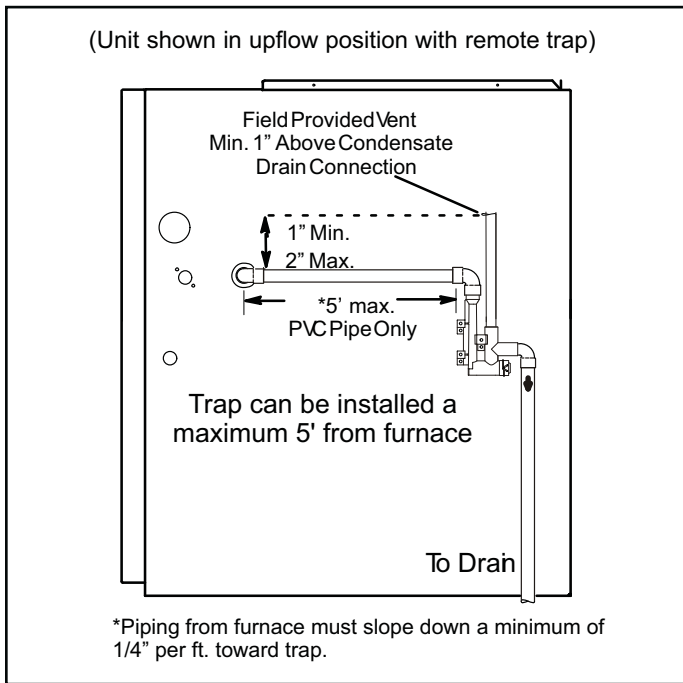


Figure 35. Condensate Trap Locations

Condensate line must slope downward away from the trap to drain. If drain level is above condensate trap, condensate pump must be used. Condensate drain line should be routed within the conditioned space to avoid freezing of condensate and blockage of drain line. If this is not possible, a heat cable kit may be used on the condensate trap and line.

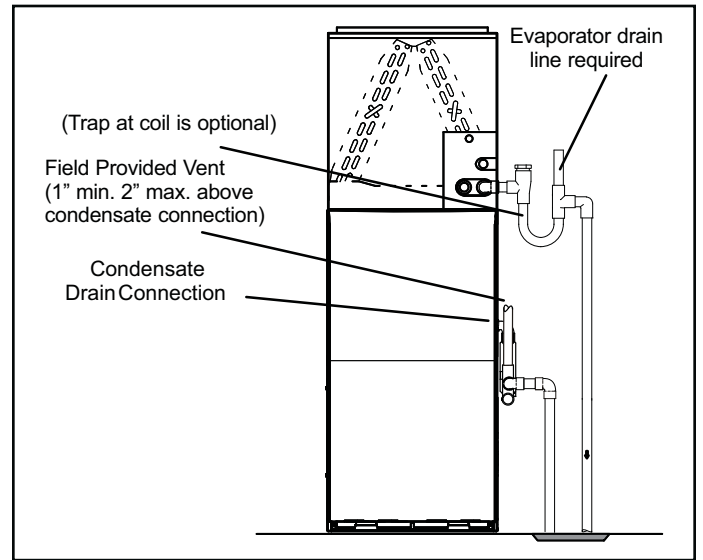


Figure 36. Furnace with Evaporator Coil Using a Separate Drain

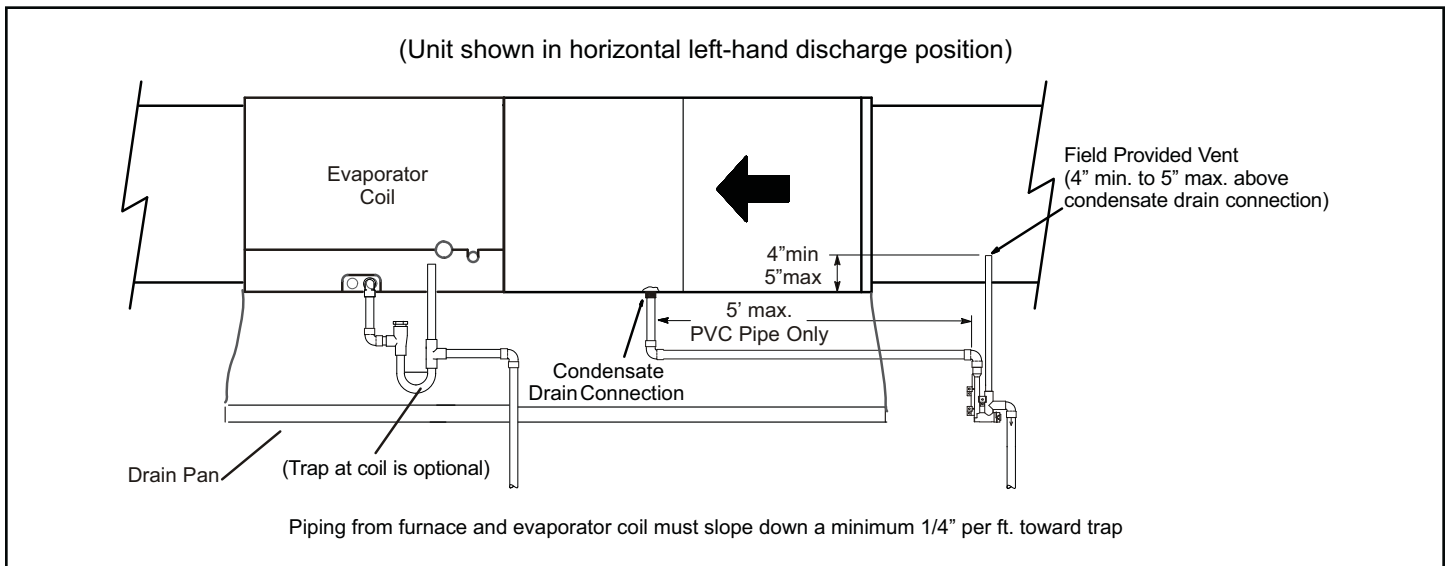


Figure 37. Furnace with Evaporator Coil Using a Separate Drain

⚠ IMPORTANT

When combining the furnace and evaporator coil drains together, the A/C condensate drain outlet must be vented to relieve pressure in order for the furnace pressure switch to operate properly.

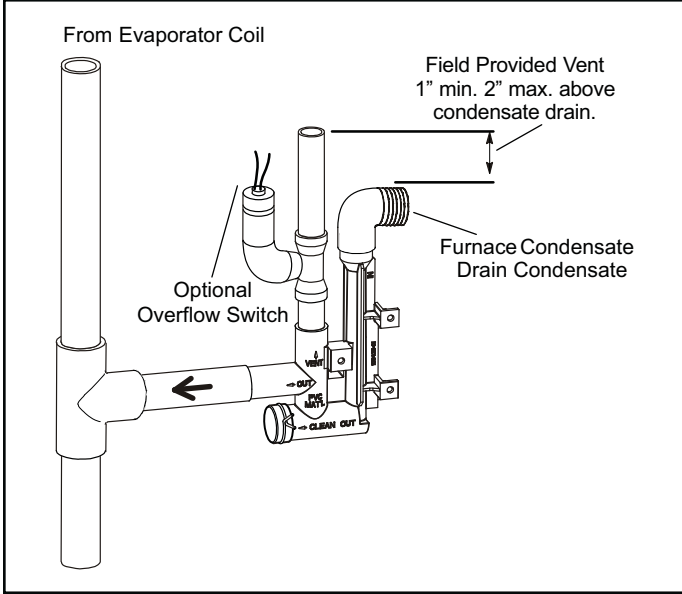


Figure 38. Condensate Trap With Optional Overflow Switch

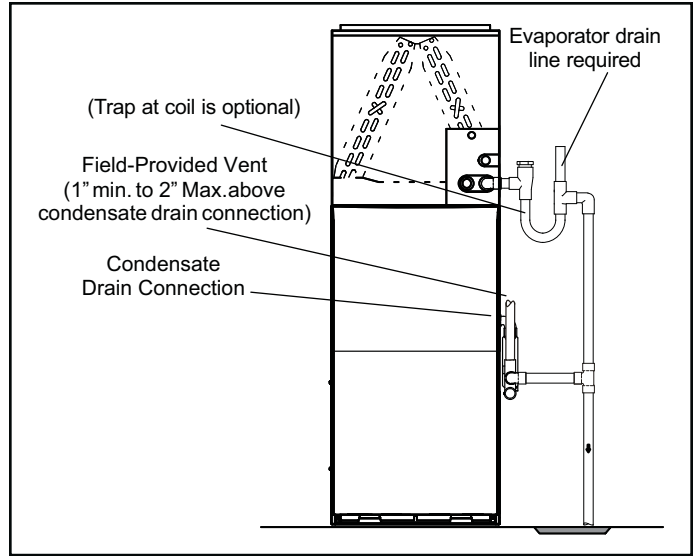


Figure 39. Furnace with Evaporator Coil Using a Common Drain

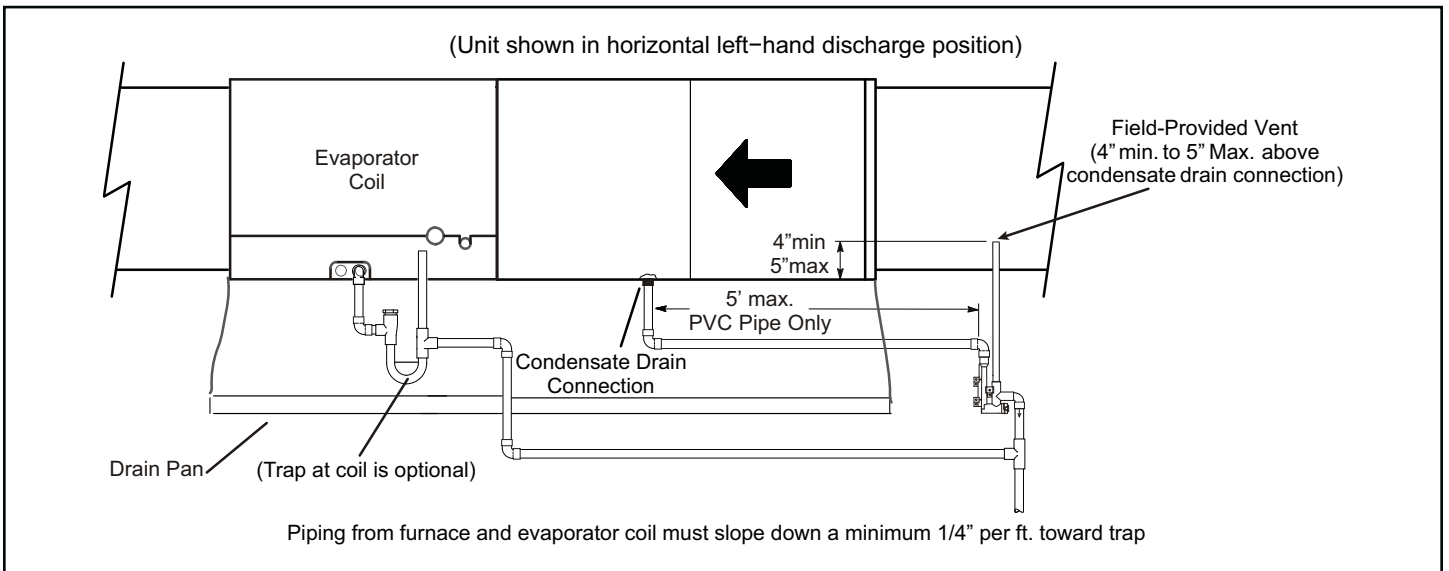
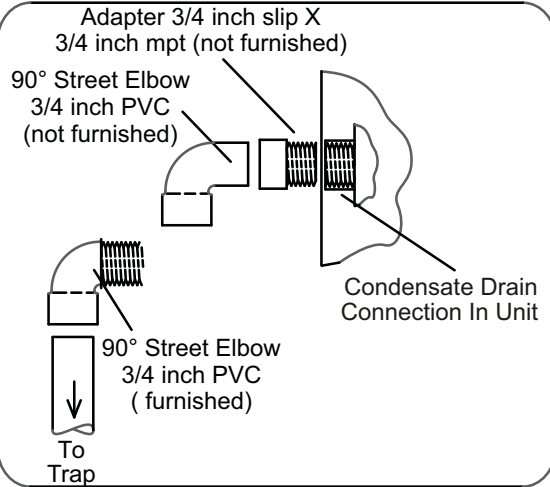
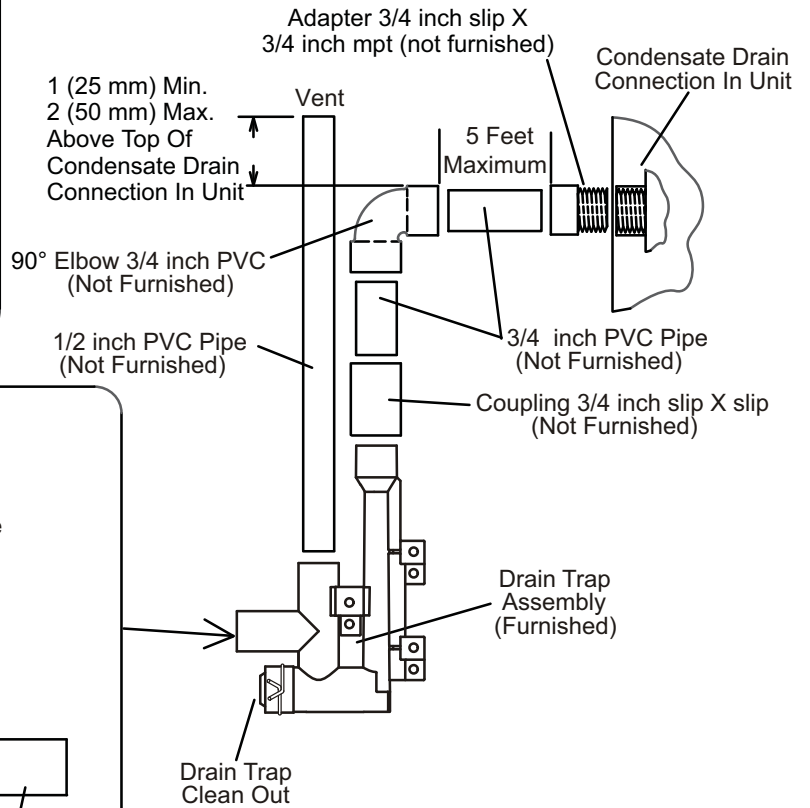
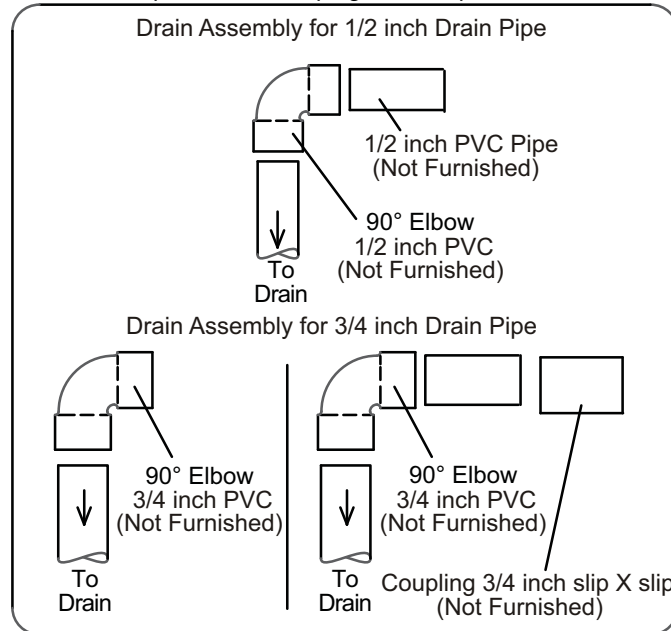


Figure 40. Furnace with Evaporator Coil Using a Common Drain

Optional Condensate Drain Connection

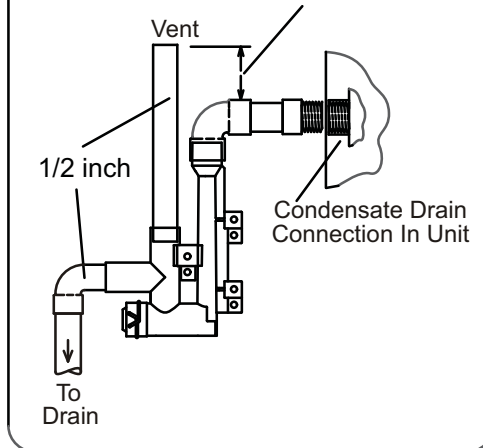


Optional Drain Piping from Trap



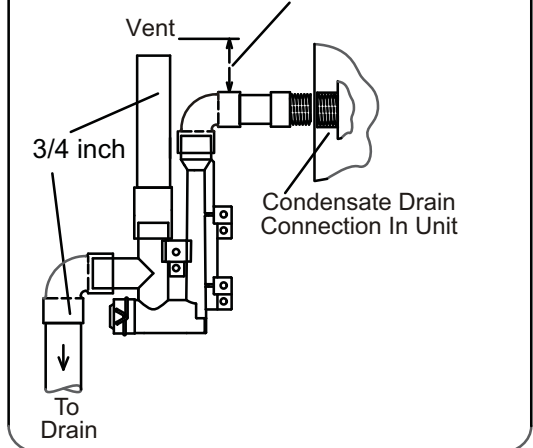
Drain Trap Assembly with 1/2 inch Piping

1 (25 mm) Min. 2 (50 mm) Max. Above Top Of Condensate Drain Connection In Unit



Drain Trap Assembly with 3/4 inch Piping

1 (25 mm) Min. 2 (50 mm) Max. Above Top Of Condensate Drain Connection In Unit



Drain Trap Assembly (Furnished)

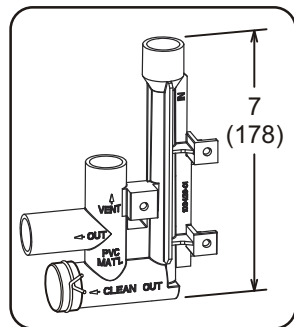


Figure 41. Trap / Drain Assembly Using 1/2" PVC or 3/4" PVC

Gas Piping

Gas supply piping should not allow more than 0.5" w.c. drop in pressure between gas meter and unit. Supply gas pipe must not be smaller than unit gas connection.

⚠ 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.

⚠ WARNING

Do not over torque (800 in-lbs) or under torque (350 in-lbs) when attaching the gas piping to the gas valve.

1. Gas piping may be routed into the unit through the right-hand side only. Supply piping enters into the gas valve from the side of the valve as shown in Figure 43. Connect the gas supply piping into the gas valve. The maximum torque is 800 in lbs and minimum torque is 350 in lbs when attaching the gas piping to the gas valve.

2. When connecting gas supply, factors such as length of run, number of fittings and furnace rating must be considered to avoid excessive pressure drop. Table 9 lists recommended pipe sizes for typical applications.

NOTE: Use two wrenches when connecting gas piping to avoid transferring torque to the manifold.

3. Gas piping must not run in or through air ducts, clothes chutes, chimneys or gas vents, dumb waiters or elevator shafts. Center gas line through piping hole. Gas line should not touch side of unit. See Figure 43 and Figure 44.

4. Piping should be sloped 1/4 inch per 15 feet (6mm per 5.6m) upward toward the gas meter from the furnace. The piping must be supported at proper intervals, every 8 to 10 feet (2.44 to 3.05m), using suitable hangers or straps. Install a drip leg in vertical pipe runs to serve as a trap for sediment or condensate.

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 51.

6. In some localities, codes may require installation of a manual main shut-off valve and union (furnished by installer) external to the unit. Union must be of the ground joint type.

⚠ IMPORTANT

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

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.

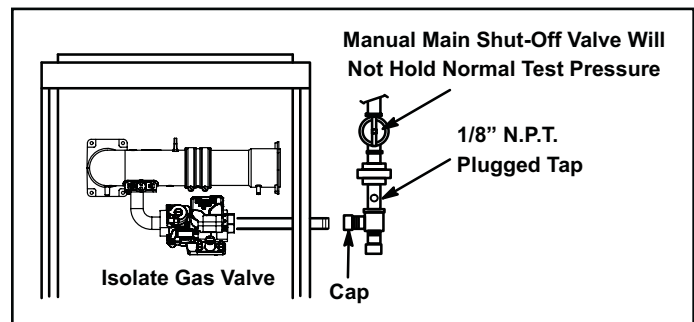


Figure 42.

⚠ IMPORTANT

When testing pressure of gas lines, gas valve must be disconnected and isolated. See Figure 42. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa).

⚠ 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.

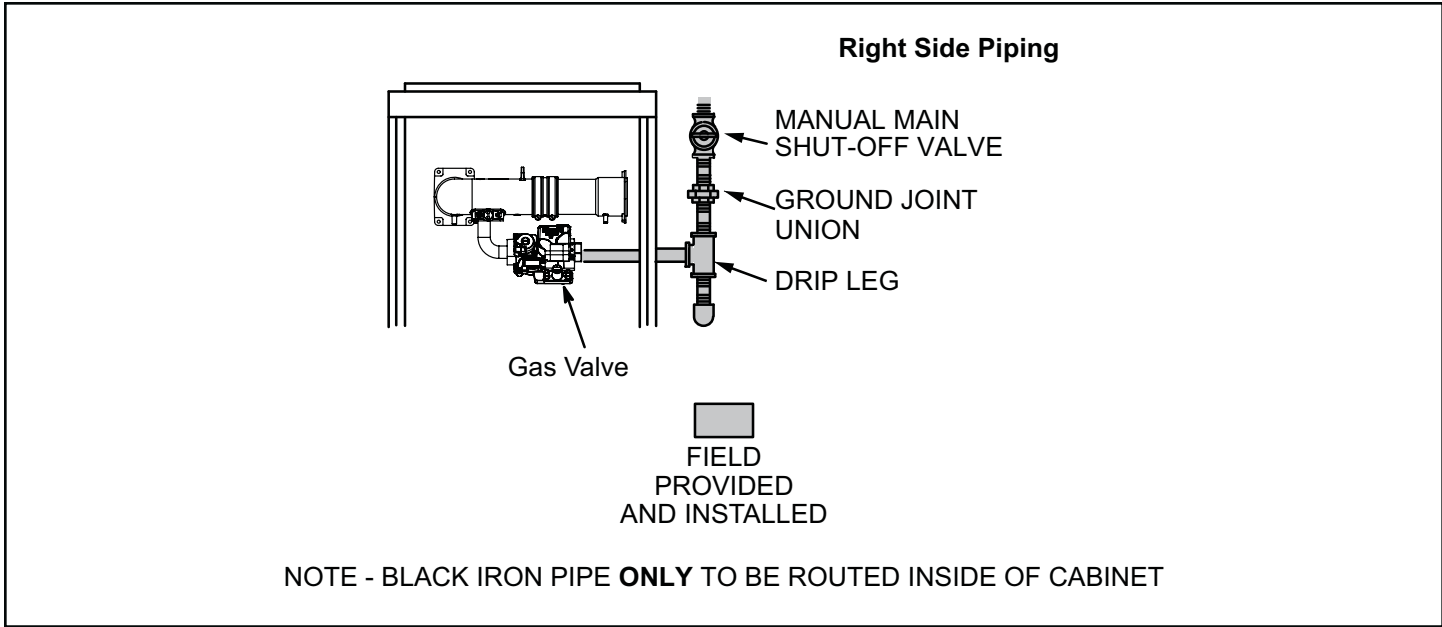


Figure 43. Possible Gas Piping Configurations - Upflow Applications

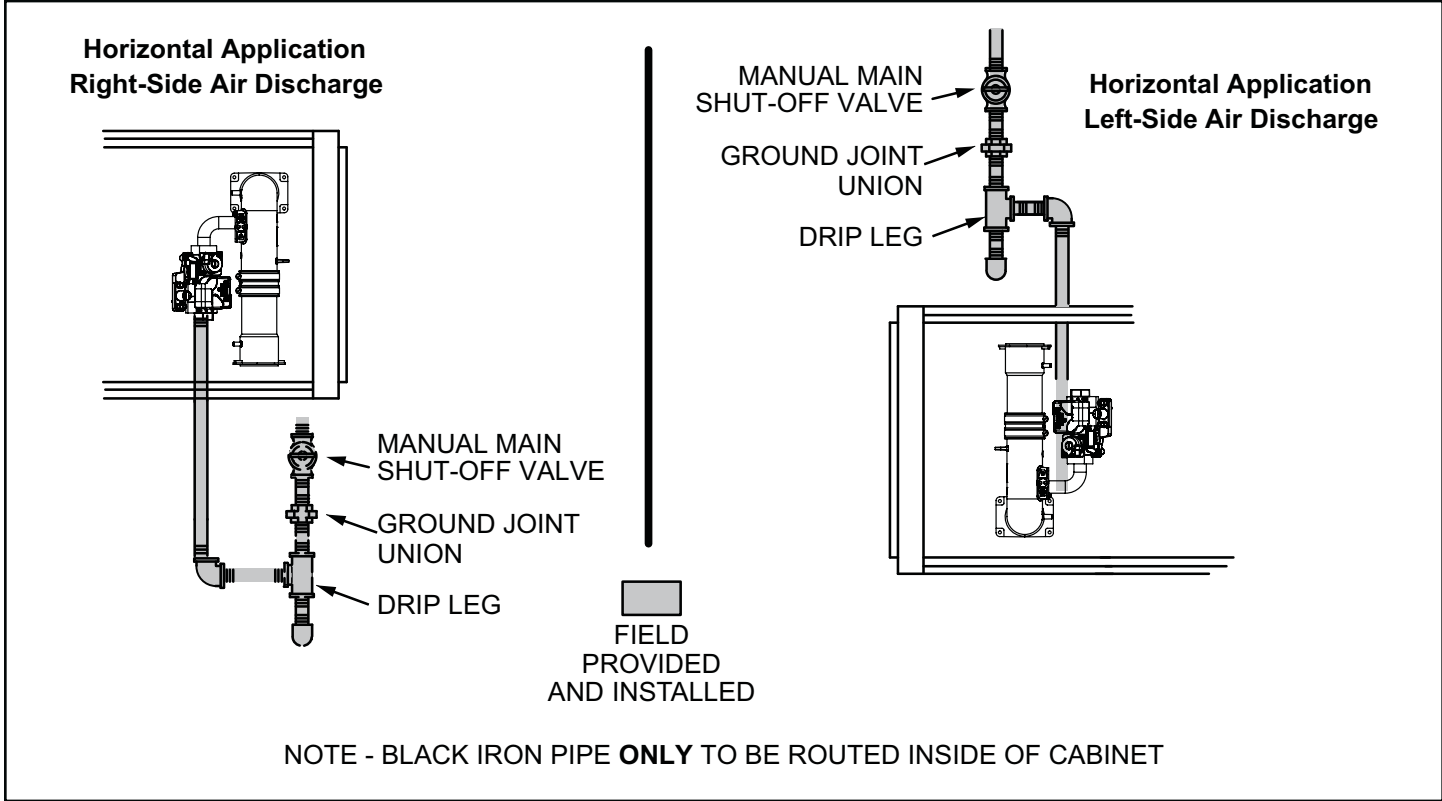


Figure 44. Possible Gas Piping Configurations - Horizontal Applications

Gas Pipe Capacity - FT ³ /HR (kL/HR)											
Nominal Iron Pipe Size - inches (mm)	Internal Diameter - inches (mm)	Length or 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)	172 (4.87)	118 (3.34)	95 (2.69)	81 (2.29)	72 (2.03)	65 (1.84)	60 (1.69)	56 (1.58)	52 (1.47)	50 (1.42)
3/4 (19.05)	.824 (20.930)	360 (10.19)	247 (7.00)	199 (5.63)	170 (4.81)	151 (4.28)	138 (3.87)	126 (3.56)	117 (3.31)	110 (3.11)	104 (2.94)
1 (25.4)	1.049 (26.645)	678 (19.19)	466 (13.19)	374 (10.59)	320 (9.06)	284 (8.04)	257 (7.27)	237 (6.71)	220 (6.23)	207 (5.86)	195 (5.52)
1-1/4 (31.75)	1.380 (35.052)	1350 (38.22)	957 (27.09)	768 (22.25)	657 (18.60)	583 (16.50)	528 (14.95)	486 (13.76)	452 (12.79)	424 (12.00)	400 (11.33)
1-1/2 (38.1)	1.610 (40.894)	2090 (59.18)	1430 (40.49)	1150 (32.56)	985 (27.89)	873 (24.72)	791 (22.39)	728 (20.61)	677 (19.17)	635 (17.98)	600 (17.00)
2 (50.8)	2.067 (52.502)	4020 (113.83)	2760 (78.15)	2200 (62.30)	1900 (53.80)	1680 (47.57)	1520 (43.04)	1400 (39.64)	1300 (36.81)	1220 (34.55)	1160 (32.84)
2-1/2 (63.5)	2.469 (67.713)	6400 (181.22)	4400 (124.59)	3530 (99.95)	3020 (85.51)	2680 (75.88)	2480 (70.22)	2230 (63.14)	2080 (58.89)	1950 (55.22)	1840 (52.10)
3 (76.2)	3.068 (77.927)	11300 (319.98)	7780 (220.30)	6250 (176.98)	5350 (151.49)	4740 (134.22)	4290 (121.47)	3950 (111.85)	3670 (103.92)	3450 (97.69)	3260 (92.31)

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


Table 9.

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.

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.

⚠ 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.

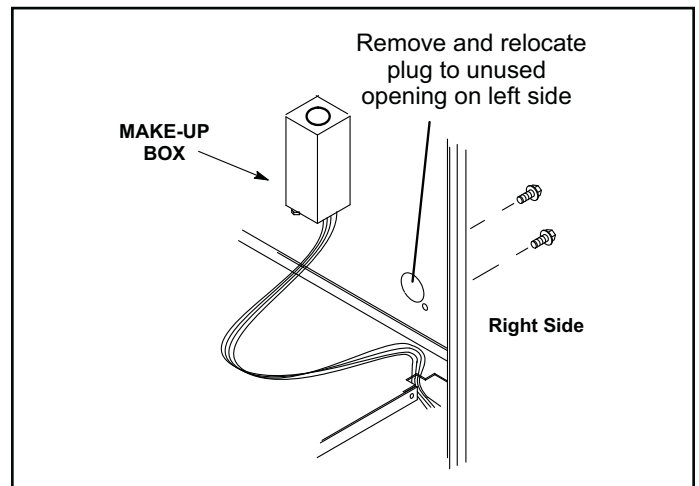


Figure 45. Interior Make-Up Box Installation

Refer to Figure 47 for wiring diagram. Table 20 show DIP switch and on-board link settings for non-communicating thermostat applications.

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.

⚠ CAUTION

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

NOTE: Unit nameplate states maximum current draw. Maximum over-current protection allowed is shown in Table 10.

Model	Cooling Capacity	Maximum Over Current Protection (Amps)
040V3B	3 ton	15
060V3B	3 ton	
080V4C	4 ton	
080V5C	5 ton	20

Table 10.

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

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

Before connecting the thermostat or the power wiring, check to make sure the wires will be long enough for servicing at a later date. Remove the blower access panel to check the length of the wire.

Complete the wiring connections to the equipment. Use the provided unit wiring diagram and the field wiring diagrams shown in Table 20. Use 18-gauge wire or larger that is suitable for Class II rating for thermostat connections.

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

NOTE: The NF97X***V**R furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

One line voltage “ACC” 1/4” spade terminal is provided on the furnace integrated control. Any electronic air cleaner or other accessory rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to the one of the provided neutral terminals. See Figure 48 for control configuration. This terminal is energized when the indoor blower is operating.

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.

Install the room thermostat according to the instructions provided with the thermostat. See Table 20 for field wiring connections in varying applications. If the furnace is being matched with a heat pump, refer to the instruction packaged with the dual fuel thermostat.

Thermostat Selection

⚠ CAUTION

Field wiring for non-communicating applications is illustrated in diagrams which begins on page 39.

Non-Communicating

In non-communicating applications the NF97X***V**R is designed to operate in a SINGLE-STAGE mode or TWO-STAGE mode using a conventional thermostat.

For optimal performance in non-communicating applications, GE Appliances recommends use of a conventional high quality electronic digital thermostat or any other with adjustable settings for 1st stage / 2nd stage on / off differentials and adjustable stage timers.

Indoor Blower Speeds

Non-Communicating

- When the thermostat is set to “FAN ON,” the indoor blower will run continuously at a field selectable percentage of the second-stage cooling speed when there is no cooling or heating demand. The factory default setting is 38% of cool speed. See Table 22 for allowable continuous circulation speeds.
- When the NF97X***V**R is running in the heating mode, the indoor blower will run on the heating speed designated by the positions of DIP switches 11, 12 and 13. See Table 21 for allowable heating speeds.
- When there is a cooling demand, the indoor blower will run on the cooling speed designated by the positions of DIP switches 5 and 6. First stage cooling will run at 70% cool speed.

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 (Range: 102 volts to 132 volts)
- The furnace operates at 60 Hz + 5% (Range: 57 Hz to 63 Hz)
- The furnace integrated control requires both correct 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% THD (total harmonic distortion)

Integrated Control DIP Switch Settings -

Conventional Thermostat (non-communicating)

NF97X***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 and jumpers. The control includes an internal soft lockout feature which automatically resets the ignition control when it has been locked out. After one hour of continuous thermostat demand for heat, the soft lockout feature will break and remake thermostat demand to the furnace and automatically reset the control to relight the furnace.

NOTE: For conventional thermostats proceed with DIP switch and clippable link settings as outlined in the following.

Heating Operation 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.

- a. Select "OFF" for two-stage heating operation controlled by a two-stage heating thermostat (factory setting);
- b. 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 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 -- 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 11 provides the blower off timings that will result from different switch settings.

Blower Off Delay (Seconds)	Switch 3	Switch 4
60	On	Off
90 (Factory)	Off	Off
120	Off	On
180	On	On

Table 11. Blower Off Delay Switch Settings
Indoor Blower Operation DIP Switch Settings

Switches 5 and 6 -- 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 12 provides the cooling mode blower speeds that will result from different switch settings. Switches 5 and 6 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.

Speed	Switch 5	Switch 6
Low	On	On
Medium Low	Off	On
Medium High	On	Off
High (Factory)	Off	Off

Table 12. Cooling Mode Blower Speeds

Switches 7 and 8 -- Cooling 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 13 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.

Adjustment	Switch 7	Switch 8
+10% (approx.)	On	Off
Factory Default	Off	Off
-10% (approx.)	Off	On

Table 13. Cooling Blower Speed Adjustment

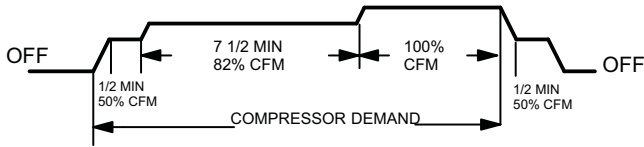
Switches 9 and 10 -- Cooling Mode Blower Speed Ramping -- Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on dehumidification performance. Table 14 provides the cooling mode blower speed ramping options that will result from different switch settings.

NOTE: The off portion of the selected ramp profile also applies during heat pump operation in dual fuel applications.

Ramping Option	Switch 9	Switch 10
A (Factory)	Off	Off
B	Off	On
C	On	Off
D	On	On

Table 14. Cooling Mode Blower Speed Ramping
Ramping Option A (Factory Selection)

- Motor runs at 50% for 30 seconds.
- Motor then runs at 82% for approximately 7-1/2 minutes.
- If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 50% for 30 seconds then ramps down to stop.



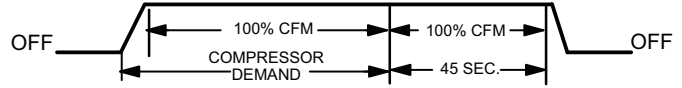
Ramping Option B

- Motor runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.



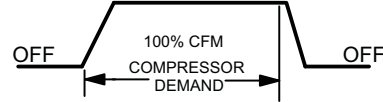
Ramping Option C

- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 45 seconds then ramps down to stop.



Ramping Option D

- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.



Switches 11, 12 and 13 -- Heating Mode Blower Speed

-- The switches are factory set to the OFF position which provides factory default heat speed. Refer to Table 15 for switches 11, 12 and 13 that provided the corresponding increases or decrease to both high and low heat demand. See Table 21 for allowable heating speeds.

Unnumbered DIP switch is unused

Heat Speed	Switch 11	Switch 12	Switch 13
Increase 24%	On	On	On
Increase 18%	On	On	Off
Increase 12%	On	Off	On
Increase 6%	On	Off	Off
Factory Default	Off	Off	Off
Decrease 6%	Off	Off	On
Decrease 12%	Off	On	Off
Decrease 18%	Off	On	On

Table 15. Heating Mode Blower Speeds

Ignition Control

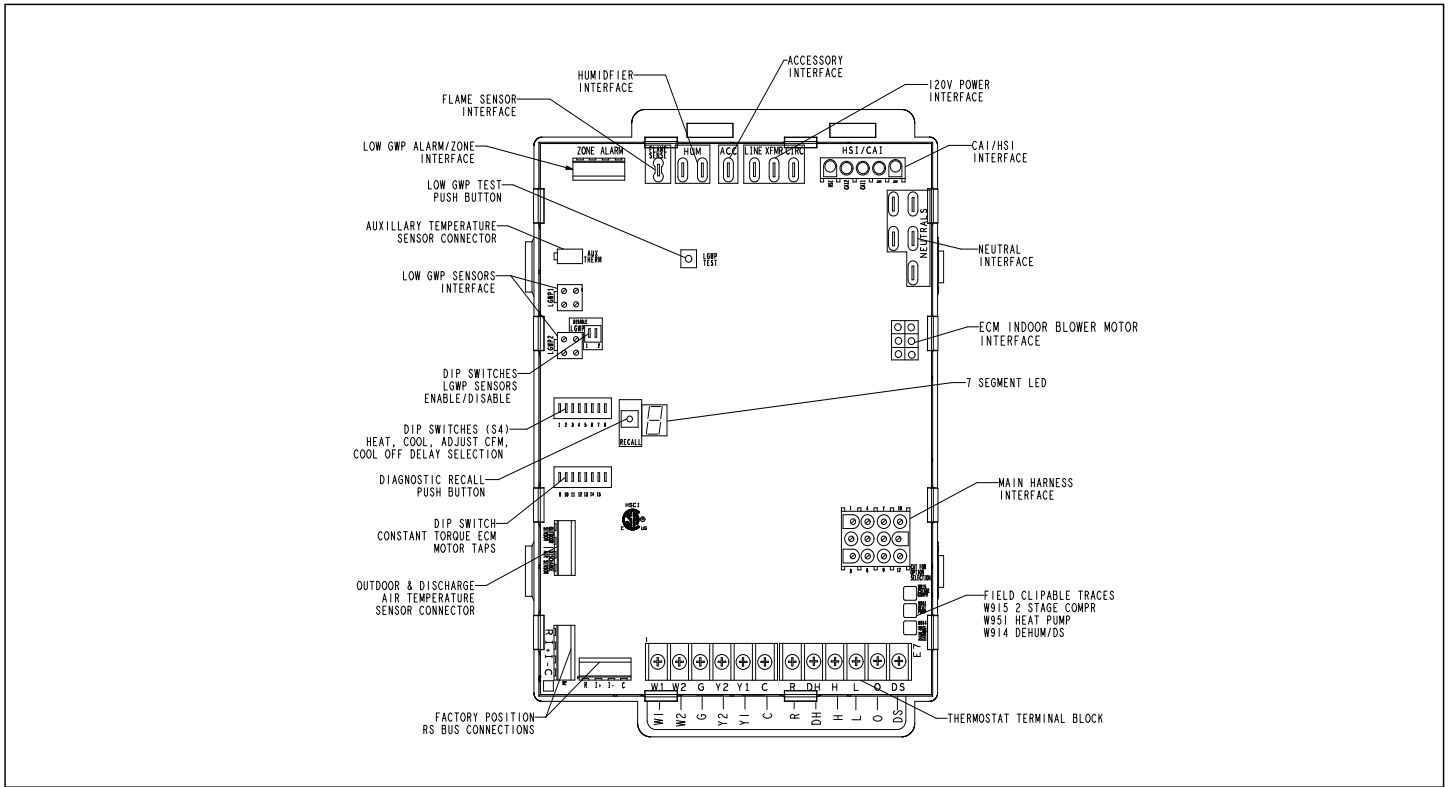


Figure 46.

Table 16

1/4" QUICK CONNECT TERMINALS	
HUM	120 VAC OUTPUT TO HUMIDIFIER
XMFR	120 VAC OUTPUT TO TRANSFORMER
L1	120 VAC INPUT TO CONTROL
CIRC	120 VAC OUTPUT TO CIRCULATING BLOWER
ACC	120 VAC TO ELECTRICAL AIR CLEANER
NEUTRALS (5)	120 VAC NEUTRAL

Table 17

12 PIN MAIN HARNESS	
1	MAIN VALVE HIGH
2	HIGH PRESSURE SWITCH
3	ROLLOUT INPUT
4	GROUND
5	24VAC HOT
6	HIGH LIMIT SWITCH
7	MAIN VALVE LOW
8	MAIN VALVE COMMON
9	24VAC RETURN
10	GROUND
11	ROLLOUT SWITCH OUTPUT
12	LOW PRESSURE SWITCH

Table 18

THERMOSTAT INPUT TERMINALS	
W1	LOW STAGE HEAT
W2	HIGH STAGE HEAT
G	FAN
Y1	LOW STAGE COOL
Y2	HIGH STAGE COOL
C	THERMOSTAT COMMON / GROUND
R	24VAC POWER TO THE THERMOSTAT
DH	DEHUMIDIFICATION (COMM ONLY)
H	24V HUMIDIFIER OUTPUT
L	LSOM (COMM ONLY)
O	HEAT PUMP REVERSING VALVE
DS	DEHUMIDIFICATION (NON-COMM ONLY)

Table 19

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 (DRY CONTACT)
LGWP TEST	PUSH BUTTON TO TEST LOW GWP FUNCTIONALITY

Ignition Control Diagnostic Codes

DIAGNOSTIC CODES / STATUS OF FURNACE	CODE
IDLE MODE (DECIMAL BLINKS AT 1 HERTZ -- 0.5 SECONDS ON, 0.5 SECONDS OFF)	.
INDOOR BLOWER OPERATION: CONTINUOUS FAN MODE (CONSTANT TORQUE ONLY)	
INDOOR BLOWER OPERATION: FOLLOWED BY CFM SETTING FOR INDOOR BLOWER (1 SECOND ON, 0.5 SECOND OFF) / CFM SETTING FOR MODE DISPLAYED (VARIABLE SPEED ONLY)	A
COOLING STAGE (1 SECOND ON, 0.5 SECOND OFF) 1 OR 2 DISPLAYED / PAUSE / REPEAT CODES. VARIABLE SPEED ONLY	C
GAS HEAT (1 SECOND ON, 0.5 SECOND OFF) PAUSE / CFM DISPLAYED / PAUSE / REPEAT CODES BLINKING - IGNITION	H
HEAT PUMP STAGE (1 SECOND ON, 0.5 SECOND OFF) 1 OR 2 DISPLAYED / PAUSE / CFM SETTING DISPLAYED / PAUSE / REPEAT CODES	h
DEFROST MODE	dF
ERROR/FAULT CONDITION	CODE
NO ERROR IN THE MEMORY	E000
ELECTRICAL FAULTS (WAIT FOR RECOVERY)	
AC LINE VOLTAGE LOW	E110
LINE VOLTAGE POLARITY REVERSED	E111
EARTH GROUND NOT DETECTED	E112
AC LINE VOLTAGE HIGH	E113
LINE VOLTAGE FREQUENCY OUT OF RANGE	E114
LOW 24V - CONTROL WILL RESTART IF THE ERROR RECOVERS	E115
HARDWARE FAULT (5 MINUTES LOCKOUT)	
CONTROL HARDWARE (INCLUDE A/D ELECTRONICS AND FLAME TEST) FAILURE	E125
HARD LOCKOUT FAULT	
ROLLOUT OPEN OR PREVIOUSLY OPENED	E200
GAS VALVE/PRESSURE SWITCH/LIMIT FAULTS (wait for recovery)	
GAS VALVE RELAY (1ST OR 2ND STAGE) PROBLEM	E204
GAS VALVE 2ND STAGE BRELAY PROBLEM	E206
LOW PRESSURE SW FAILED TO CLOSE (STUCK OPEN)	E223
LOW PRESSURE SW FAILED TO OPEN (STUCK CLOSED)	E224
HIGH PRESSURE SW FAILED TO CLOSE (STUCK OPEN)	E225
HIGH PRESSURE SW FAILED TO OPEN (STUCK CLOSED)	E226
LOW PRESSURE SWITCH OPENED IN RUN OR TFI	E227
FLAME SENSE OUT OF SEQUENCE-STILL PRESENT	E241
PRIMARY LIMIT SWITCH OPENED	E250
RSBUS COMMUNICATION CODES	
DEVICE COMMUNICATION PROBLEM - NO OTHER DEVICES ON BUS	E105
UNRESPONSIVE DEVICE	E120
ACTIVE SUBNET CONTROLLER MISSING FOR MORE THAN 3 MINUTES	E124
OUTDOOR UNITS CODES	
RELAY Y1 STUCK	E344
RELAY O FAILURE	E345
OUTDOOR AIR TEMPERATURE SENSOR FAILURE	E180
RELAY Y1 FAILURE - RELAY ENERGIZED BUT NO INPUT SENSED	E347
RELAY Y2 FAILURE - RELAY ENERGIZED BUT NO INPUT SENSED	E348
INTERLOCK SWITCH (DS TERMINAL) SENSED OPEN	E370

Ignition Control Diagnostic Codes (Continued)

SOFT LOCKOUT FAULTS (60 MINUTES)	
UNABLE TO COMMUNICATE WITH CIRCULAR MOTOR	E201
GAS VALVE RELAY (1ST OR 2ND STAGE) CONTACT SHORTED	E205
HOT SURFACE IGNITOR (HSI) SENSED OPEN	E207
SOFT LOCKOUT-FLAME FAILURE ON IGNITION, IGNITION RETRY>MAX, LAST FAILED RETRY DUE TO FLAME FAILURE	E270
SOFT LOCKOUT-PRESSURE SWITCH OPEN, IGNITION RETRY>MAX, LAST FAILED RETRY DUE TO LPSW OPEN	E271
SOFT LOCKOUT-PRESSURE SWITCH OPEN, IN RUN MODE HEATING RECYCLES>MAX, LAST FAILED RETRY DUE TO LPSW OPEN	E272
SOFT LOCKOUT-FLAME FAILURE IN RUN MODE, HEATING RECYCLES>MAX, LAST FAILED RETRY DUE TO LOSS OF FLAME	E273
SOFT LOCKOUT-LIMIT OPEN > 3 MINUTES	E274
SOFT LOCKOUT-FLAME OUT OF SEQUENCE AND IS GONE	E275
IGNITOR CIRCUIT FAULT-FAILED IGNITOR OR TRIGGERING CIRCUITRY.	E290
INDOOR BLOWER UNABLE TO START	E292
PERFORMANCE WARNING	
POOR GROUND DETECTED	E117
IGNITION ON HIGH FIRE	E229
LOW FLAME CURRENT IN HEATING MODE	E240
NON-VOLATILE DATA CORRUPTION	E131
LOW FLAME CURRENT IN HEATING MODE	E240
DISCHARGE TEMPERATURE TOO HIGH	E252
INDOOR BLOWER MOTOR TEMPERATURE TOO HIGH	E295
DISCHARGE AIR SENSOR FAILURE - NO ERROR IF JUST DISCONNECTED, ONLY SHOW IF SHORTED OR OUT OF RANGE	E310
RESTRICTED AIRFLOW HEATING, HEAT FIRING RATE REDUCED TO MATCH CFM	E311
RESTRICTED AIRFLOW COOLING OR CONTINUOUS FAN MODE - INFORMATION ONLY	E312
INDOOR OUTDOOR UNIT CAPACITY MISMATCH	E313
LOW GWP REFRIGERANT FAULTS	
REFRIGERANT LEAK DETECTED, THERMOSTAT LOCKOUT	E150
REFRIGERANT LEAK DETECTOR SENSOR #1 FAULT	E151
REFRIGERANT LEAK DETECTOR SENSOR #2 FAULT	E152
REFRIGERANT LEAK DETECTOR SENSOR #1 COMM. LOST	E154
REFRIGERANT LEAK DETECTOR SENSOR #2 COMM. LOST	E155
REFRIGERANT LEAK DETECTOR SENSOR #1 TYPE INCORRECT	E160
REFRIGERANT LEAK DETECTOR SENSOR #2 TYPE INCORRECT	E161
REFRIGERANT LEAK DETECTOR CONTROL FAILURE	E163
LOW GWP TEST	E164
LOW GWP RELAY STUCK	E390

Table 20

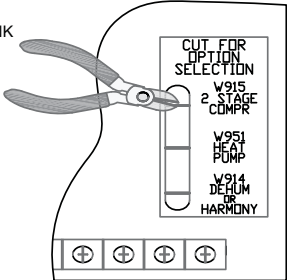
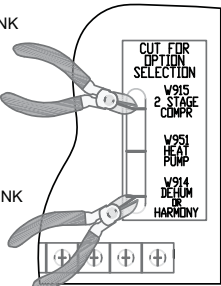
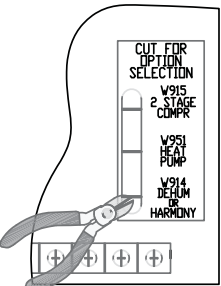
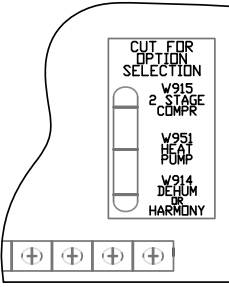
DIP Switch Settings and Field Wiring

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	DIP Switch 1 Thermostat Heating Stages	On Board Links Must Be Cut To Select System Options																															
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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 	<table border="0"> <tr> <td>S1 T'STAT</td> <td>FURNACE TERM. STRIP</td> <td>OUTDOOR UNIT</td> </tr> <tr> <td>(DS)-----</td> <td>(DH/DS)</td> <td></td> </tr> <tr> <td></td> <td>(W2)</td> <td></td> </tr> <tr> <td>(W1)-----</td> <td>(W1)</td> <td></td> </tr> <tr> <td>(R)-----</td> <td>(R)-----*</td> <td>(R)</td> </tr> <tr> <td>(G)-----</td> <td>(G)</td> <td></td> </tr> <tr> <td>(C)-----</td> <td>(C)-----</td> <td>(C)</td> </tr> <tr> <td>(Y2)-----</td> <td>(Y2)</td> <td>(Y2)</td> </tr> <tr> <td>(Y1)-----</td> <td>(Y1)-----</td> <td>(Y1)</td> </tr> <tr> <td></td> <td>(O)</td> <td></td> </tr> </table>	S1 T'STAT	FURNACE TERM. STRIP	OUTDOOR UNIT	(DS)-----	(DH/DS)			(W2)		(W1)-----	(W1)		(R)-----	(R)-----*	(R)	(G)-----	(G)		(C)-----	(C)-----	(C)	(Y2)-----	(Y2)	(Y2)	(Y1)-----	(Y1)-----	(Y1)		(O)	
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* Not required on all units.

TABLE 20 Continued

DIP Switch Settings and Field Wiring

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	<p>CUT ON-BOARD LINK W915 2 STAGE COMPR</p> 	<p>S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT</p> <p>(DH/DS)</p> <p>W2 --- W2</p> <p>W1 --- W1</p> <p>R --- R --- * --- R</p> <p>G --- G</p> <p>C --- C --- C</p> <p>Y2 --- Y2 --- Y2</p> <p>Y1 --- Y1 --- Y1</p> <p>O</p>
2 Heat / 2 Cool with t'stat with humidity control	OFF	<p>CUT ON-BOARD LINK W915 2 STAGE COMPR</p> <p>CUT ON-BOARD LINK W914 DEHUM OR HARMONY</p> 	<p>S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT</p> <p>(DH/DS)</p> <p>DS --- DS</p> <p>W2 --- W2</p> <p>W1 --- W1</p> <p>R --- R --- * --- R</p> <p>G --- G</p> <p>C --- C --- C</p> <p>Y2 --- Y2 --- Y2</p> <p>Y1 --- Y1 --- Y1</p> <p>O</p>
2 Heat / 1 Cool with t'stat with humidity control	OFF	<p>CUT ON-BOARD LINK W914 DEHUM OR HARMONY</p> 	<p>S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT</p> <p>(DH/DS)</p> <p>DS --- DS</p> <p>W2 --- W2</p> <p>W1 --- W1</p> <p>R --- R --- * --- R</p> <p>G --- G</p> <p>C --- C --- C</p> <p>Y2</p> <p>O</p>
2 Heat / 1 Cool	OFF	<p>DO NOT CUT ANY ON-BOARD LINKS</p> 	<p>S1 T'STAT FURNACE TERM. STRIP OUTDOOR UNIT</p> <p>(DH/DS)</p> <p>W2 --- W2</p> <p>W1 --- W1</p> <p>R --- R --- * --- R</p> <p>G --- G</p> <p>C --- C --- C</p> <p>Y2</p> <p>Y1 --- Y1 --- Y1</p> <p>O</p>

* Not required on all units.

TABLE 20 Continued

DIP Switch Settings and Field Wiring

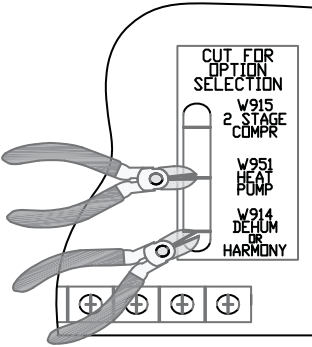
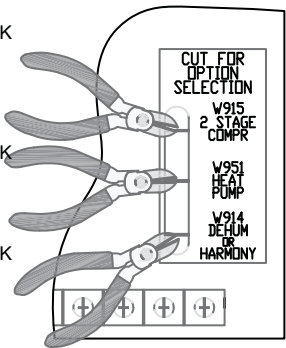
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<p>Dual Fuel Single Stage Heat Pump</p> <p>Thermostat w/ dual fuel capa- bilities Capable of 2 stage gas heat control</p>	OFF	<p>CUT ON-BOARD LINK W951 HEAT PUMP</p> <p>CUT ON-BOARD LINK W915 2 STAGE COMPR</p> <p>CUT FOR OPTION SELECTION</p> <p>V915 2 STAGE COMPR</p> <p>V951 HEAT PUMP</p> <p>V914 DEFLUM OR HARMONY</p>	<table border="0"> <tr> <td>T*STAT</td> <td>FURNACE TERM. STRIP</td> <td>HEAT PUMP</td> </tr> <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) ← 67M41* →</td> <td>(W)</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> </table>	T*STAT	FURNACE TERM. STRIP	HEAT PUMP	(R)-----	(R)-----	(R)	(H)			(W2)-----	(W2)		(W1)-----	(W1) ← 67M41* →	(W)	(O)-----	(O)	(O)	(Y1)-----	(Y1)	(Y)	(Y2)			(G)-----	(G)		(D)	(DH/DS)		(B)	(Y2)		(C)-----	(C)-----	(C)			
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(C)-----	(C)-----	(C)																																								

* 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.

TABLE 20 Continued

DIP Switch Settings and Field Wiring

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																																											
<p>Dual Fuel Single Stage Heat Pump</p> <p>Thermostat w/ dual fuel capabilities Capable of 2 stage gas heat control w/dehumidification control</p>	OFF	<p>CUT ON-BOARD LINK W951 HEAT PUMP</p> <p>CUT ON-BOARD LINK W914 DEHUM OR HARMONY</p> 	<table border="0"> <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* → (W)</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>(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* → (W)	(O) ---	(O) ---	(O) ---	(L) ---		(L) ---	(Y1) ---	(Y1) ---	(Y) ---	(Y2) ---			(G) ---	(G) ---		(D) ---	(DH/DS) ---		(B) ---	(Y2) ---		(C) ---	(C) ---	(C) ---			
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NOTE - Do NOT make a wire connection between the room thermostat L terminal and the L terminal of the furnace integrated control.

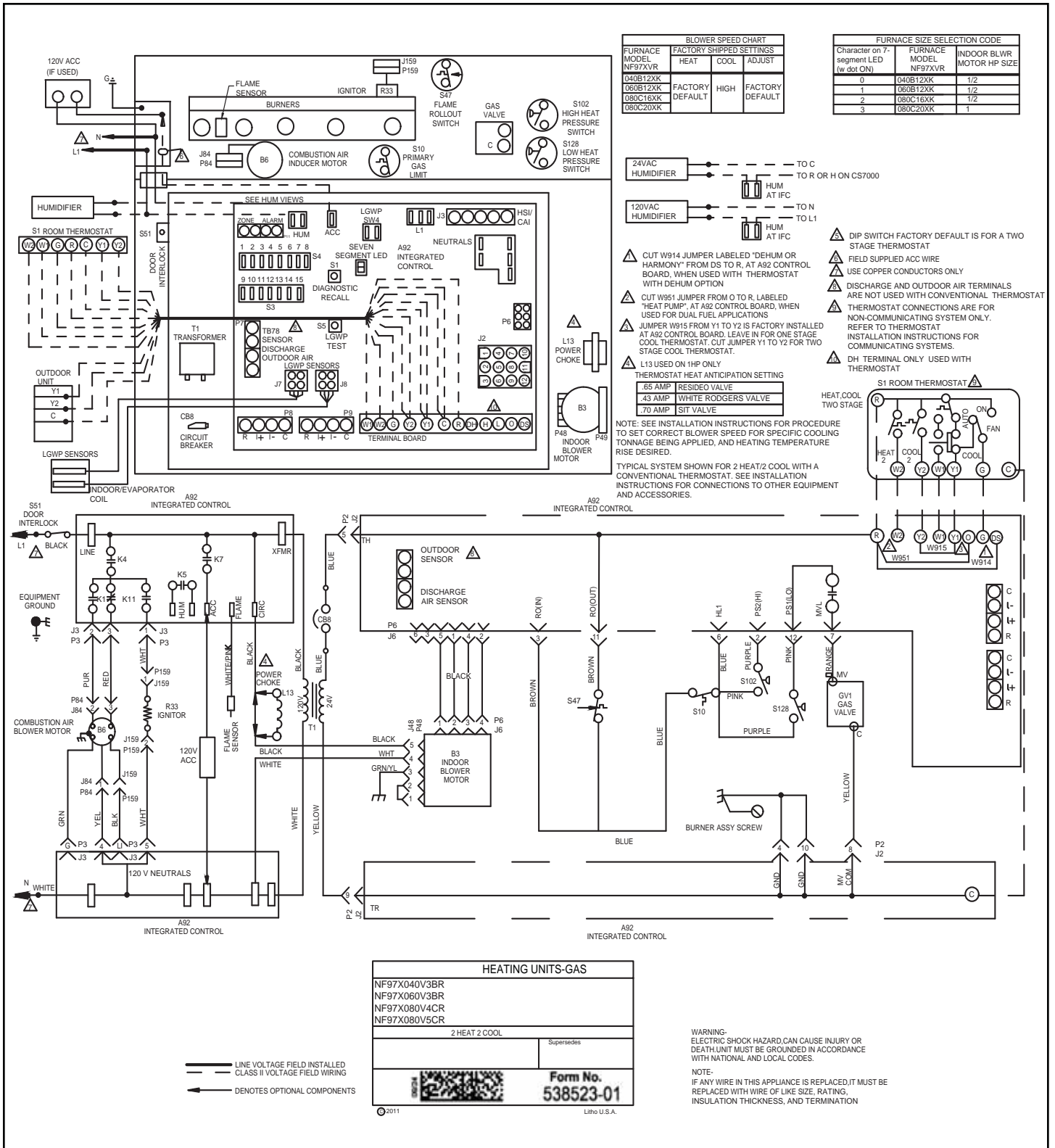


Figure 47. Wiring Diagram (Control 107900-XX)

Blower Performance

NF97X040V3BR BLOWER PERFORMANCE (less filter)

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
+24%	1151				1153			
+18%	1101				1099			
+12%	816				1041			
+6%	771				999			
Factory Default	704				944			
-6%	651				887			
-12%	578				826			
-18%	542				757			
COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	549	732	862	970	907	1072	1233	1373
Factory Default	521	637	760	873	830	975	1117	1268
-	441	560	684	784	736	574	1014	1142

NF97X060V3BR BLOWER PERFORMANCE (less filter)

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
+24%	1106				1234			
+18%	1047				1158			
+12%	989				1110			
+6%	940				1054			
Factory Default	886				999			
-6%	837				947			
-12%	780				882			
-18%	722				826			
COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	611	739	843	949	879	1046	1212	1380
Factory Default	554	681	783	883	816	952	1107	1254
-	486	630	712	802	739	876	1006	1132

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

NOTES - The effect of static pressure is included in air volumes shown.

- First stage HEAT is approximately 91% of the same second stage HEAT.
- First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.
- Continuous Fan Only speed is 38% of the selected second stage cooling speed - minimum 250 cfm.
- Zoning System Applications - Minimum blower speed is 250 cfm.

NF97X080V4CR BLOWER PERFORMANCE (less filter)

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
+24%	1499				1640			
+18%	1427				1546			
+12%	1361				1472			
+6%	1294				1399			
Factory Default	1219				1315			
-6%	1176				1242			
-12%	1090				1173			
-18%	1007				1077			
COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	797	954	1071	1241	1102	1304	1508	1713
Factory Default	713	873	969	1147	1006	1186	1392	1588
-	623	767	880	1025	911	1068	1252	1422

NF97X080V5CR BLOWER PERFORMANCE (less filter)

0 through 0.8 in. w.g. (Heating) and 0 through 1.0 in. w.g. (Cooling) External Static Pressure Range

HEATING								
¹ Heating Speed DIP Switch Settings	First Stage Heating Speed - cfm				Second Stage Heating Speed - cfm			
+24%	1477				2011			
+18%	1403				1883			
+12%	1323				1782			
+6%	1249				1697			
Factory Default	1178				1578			
-6%	1103				1477			
-12%	1033				1388			
-18%	965				1291			
COOLING								
¹ Cooling Speed DIP Switch Settings	First Stage Cooling Speed - cfm				Second Stage Cooling Speed - cfm			
	Low	Medium-Low	Medium-High	² High	Low	Medium-Low	Medium-High	² High
+	1094	1,253	1388	1580	1584	1825	2065	2286
Factory Default	984	1155	1284	1445	1454	1659	1881	2092
-	868	1021	1152	1302	1301	1490	1693	1890

¹ Cooling and heating speeds are based on a combination of DIP switch settings on the furnace control. Refer to Installation Instructions for specific DIP Switch Settings.

² Factory default setting.

NOTES - The effect of static pressure is included in air volumes shown.

- First stage HEAT is approximately 91% of the same second stage HEAT.
- First stage COOL (two-stage air conditioning units only) is approximately 70% of the same second stage COOL speed position.
- Continuous Fan Only speed is 38% of the selected second stage cooling speed - 080°C16 minimum 380 cfm, 080°C20 minimum 450 cfm.
- Zoning System Applications - 080C16X minimum blower speed is 380 cfm, 080°C20 is 450 cfm.

Allowable Heating Speeds									
Model	Cooling Capacity	-18%	-12%	-6%	Default	+6%	+12%	+18%	+24%
040	3 ton	Allowed	Allowed	Allowed	Factory Setting	Allowed	Allowed	Allowed	Allowed
060	3 ton	Allowed	Allowed	Allowed	Factory Setting	Allowed	Allowed	Allowed	Allowed
080	4 ton	Allowed	Allowed	Allowed	Factory Setting	Allowed	Allowed	Allowed	Not Allowed
080	5 ton	Allowed	Allowed	Allowed	Factory Setting	Allowed	Allowed	Allowed	Allowed

Table 21.

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

Table 22.

Operating Sequence		System Demand						System Response		
System Condition	Step	Thermostat Demand				Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		Y1	O	G	W1	Status	D			
NO CALL FOR DEHUMIDIFICATION										
Normal Operation	1	On	On	On		Acceptable	24 VAC	High	100%	Compressor and indoor blower follow thermostat demand
BASIC MODE (only active on a Y1 thermostat demand)										
Normal Operation	1	On	On	On		Acceptable	24 VAC	High	100%	Thermostat energizes Y1 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On		Demand	0 VAC	High	70%*	
PRECISION MODE (operates independent of a Y1 thermostat demand)										
Normal Operation	1	On	On	On		Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification Call	2	On	On	On		Demand	0 VAC	High	70%*	
Dehumidification Call ONLY	1	On	On	On		Demand	0 VAC	High	70%*	Thermostat will try to maintain room humidity set point by allowing the room space to maintain a cooler room thermostat set point**
	Jumpers at indoor unit with a single stage outdoor unit With condensing unit - Cut W914 (R to DS) on furnace control With heat pump - Cut W914 (R to DS) & W951 (R to O) on furnace control									
*Dehumidification blower speed is 70% of COOL speed for all units.										

Table 23. Operating Sequence
Non-Communicating 24V Thermostat with Humidity Control Feature and Single-Speed Outdoor Unit

Operating Sequence		System Demand								System Response		
System Condition	Step	Thermostat Demand						Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		Y1	Y2	O	G	W1	W2	Status	D			
NO CALL FOR DEHUMIDIFICATION												
Normal Operation - Y1	1	On		On	On			Acceptable	24 VAC	Low	70%*	Compressor and indoor blower follow thermostat demand
Normal Operation - Y2	2	On	On	On	On			Acceptable	24 VAC	High	100%	
ROOM THERMOSTAT CALLS FOR FIRST STAGE COOLING												
BASIC MODE (only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%*	Thermostat energizes Y2 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%**	
PRECISION MODE (operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%*	Dehumidification mode begins when humidity is greater than set point
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%**	
Dehumidification Call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%**	Thermostat will try to maintain room humidity set point by allowing the room space to maintain a cooler room thermostat set point***
ROOM THERMOSTAT CALLS FOR FIRST AND SECOND STAGE COOLING												
BASIC MODE (only active on a Y1 thermostat demand)												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	Thermostat energizes Y2 and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%**	
PRECISION MODE (operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%*	Dehumidification mode begins when humidity is greater than set point
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%**	
Dehumidification Call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%**	Thermostat will try to maintain room humidity set point by allowing the room space to maintain a cooler room thermostat set point***
	Jumpers at indoor unit with a two stage outdoor unit Cut factory jumper from Y1 to Y2 or cut W915 (Y1 to Y2) With condensing unit - Cut W914 (R to DS) on furnace control With heat pump - Cut W914 (R to DS) & W951 (R to O) on furnace control											
*Normal operation first stage cooling blower speed is 70% COOL speed.												
**Dehumidification blower speed is, reduced to 70% of COOL.												

**Table 24. Operating Sequence
Non-Communicating 24V Thermostat with Humidity Control Feature and Two-Speed Outdoor Unit**

Low GWP Application

⚠ WARNING

For use with 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 50** 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 48. 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 48

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 49** and **TABLE 25**.



Figure 49

Table 25

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 25** 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 50** 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 "DIAGNOSTIC CODES / STATUS OF FURNACE" on page 42 for Low GWP diagnostic error codes.

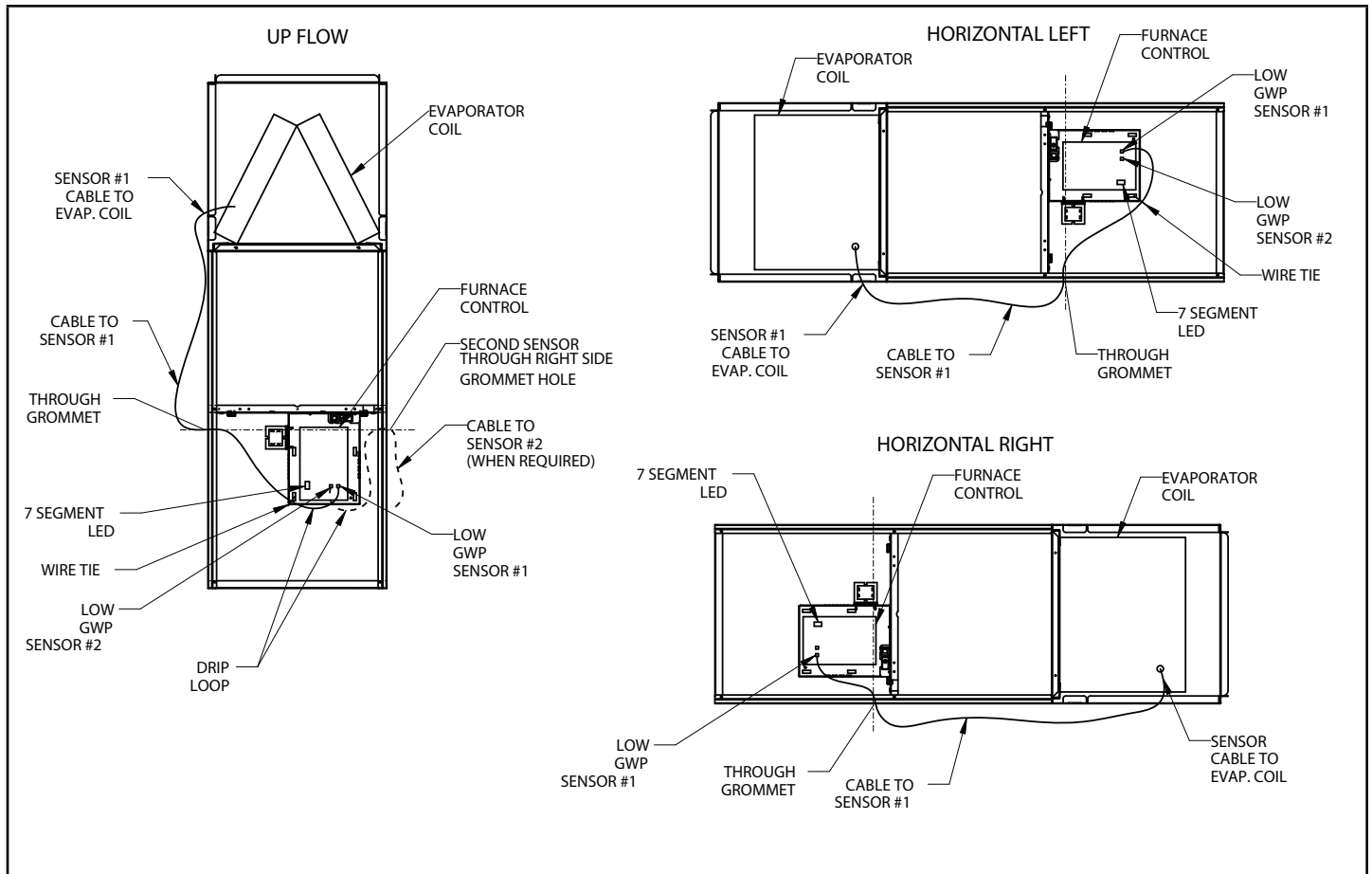


Figure 50

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 26 lists the functions of the Test button during each mode of operation.

Table 26
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 27 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 27
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 "DIAGNOSTIC CODES / STATUS OF FURNACE" on page 42 for Low GWP 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.
The system then executes a leak detection response.
3. Observe the following sequence:
 - a. The LED indicator for leak detection. See "DIAGNOSTIC CODES / STATUS OF FURNACE" on page 42 for Low GWP diagnostic error 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.

Installation of control is complete after both sequences are successful.

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 (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 a thermostat that features humidity control. Refer to Table 23 for operation sequence in applications including NF97X***V**R, a thermostat which features humidity control and a single-speed outdoor unit. Table 24 gives the operation sequence in applications with a two-speed outdoor unit.

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.

Unit Start-Up

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING

Do not use this furnace if any part has been underwater. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. Immediately call a qualified service technician to inspect the furnace and to replace all gas controls, control system parts, and electrical parts that have been wet or to replace the furnace, if deemed necessary.

WARNING



Danger of explosion. Can cause injury or product or property damage. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply.

CAUTION

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

BEFORE LIGHTING the unit, smell all around the furnace 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 the NF97X***V**R is equipped with a gas control switch (lever). Use only your hand to move switch. Never use tools. If the switch will not move by hand, do not try to repair it. Force or attempted repair may result in a fire or explosion.

Placing the Furnace into Operation

NF97X***V**R units are equipped with an automatic hot surface ignition system. Do not attempt to manually light burners on this furnace. 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 these units.

Priming Condensate Trap

The condensate trap should be primed with water prior to start-up to ensure proper condensate drainage. Either pour 10 fl. oz. (300 ml) of water into the trap, or follow these steps to prime the trap:

1. Follow the lighting instructions to place the unit into operation.
2. Set the thermostat to initiate a heating demand.
3. Allow the burners to fire for approximately 3 minutes.
4. Adjust the thermostat to deactivate the heating demand.
5. Wait for the combustion air inducer to stop. Set the thermostat to initiate a heating demand and again allow the burners to fire for approximately 3 minutes.

- Adjust the thermostat to deactivate the heating demand and wait for the combustion air inducer to stop. At this point, the trap should be primed with sufficient water to ensure proper condensate drain operation.

⚠ WARNING

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

Gas Valve Operation

See Figure 51

- STOP!** Read the safety information at the beginning of this section.
- Set the thermostat to the lowest setting.
- Turn off all electrical power to the unit.
- This furnace is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.
- Remove the access panel.
- Move gas valve switch to OFF. See Figure 51.
- Wait five minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to next step.
- Move gas valve switch to ON. See Figure 51.

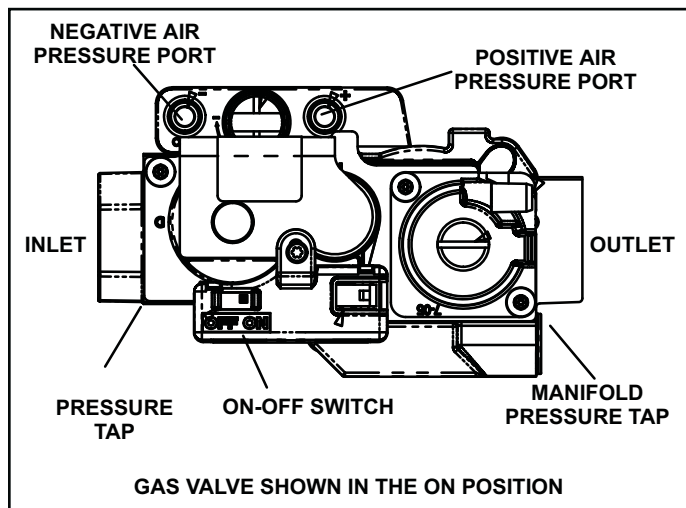


Figure 51. Gas Valve

- Replace the access panel.
- Turn on all electrical power to the unit.
- 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.

- 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

- Set the thermostat to the lowest setting.
- Turn off all electrical power to the unit if service is to be performed.
- Remove the access panel.
- Move gas valve switch to OFF.
- Replace the access panel.

Failure to Operate

If the unit fails to operate, check the following:

- Is the thermostat calling for heat?
- Are access panels securely in place?
- Is the main disconnect switch closed?
- Is there a blown fuse or tripped breaker?
- Is the filter dirty or plugged? Dirty or plugged filters will cause the limit control to shut the unit off.
- Is gas turned on at the meter?
- Is the manual main shut-off valve open?
- Is the internal manual shut-off valve open?
- Is the unit ignition system in lockout? If the unit locks out again, inspect the unit for blockages.

Heating Sequence of Operation

- When thermostat calls for heat, combustion air inducer starts.
- Combustion air pressure switch proves blower operation. Switch is factory set and requires no adjustment.
- After a 15-second pre-purge, the hot surface ignitor energizes.
- After a 20-second ignitor warm-up period, the gas valve solenoid opens. A 4-second trial for ignition period begins.
- Gas is ignited, flame sensor proves the flame, and the combustion process continues.
- If flame is not detected after first ignition trial, the ignition control will repeat steps 3 and 4 four more times before locking out the gas valve (soft lockout flame failure mode). The ignition control will then automatically repeat steps 1 through 6 after 60 minutes. To interrupt the 60-minute soft lockout period, move thermostat from "Heat" to "OFF" then back to "Heat." Heating sequence then restarts at step 1.

Gas Pressure Adjustment

Gas Flow (Approximate)

Model	Seconds for One Revolution	
	Natural	
	1 cu ft Dial	2 cu ft Dial
040	90	180
060	60	120
080	45	90
Natural - 1000 btu/cu ft		

Table 28. Gas Meter Clocking Chart

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 28. If manifold pressure matches Table 29 and rate is incorrect, check gas orifices for proper size and restriction. Remove temporary gas meter if installed.

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

Supply Pressure Measurement

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

Altitude	Unit	Natural	
		High Fire in. w.c.	Low Fire in. w.c.
0 - 4,500 ft.	040	3.5	1.7
	060		
	080		
4,501 - 7,500 ft.	040	n/a	n/a
	060	2.3	1.2
	080	2.4	1.2

Table 29. Supply Line and Manifold Pressure (inches w.c.)

Manifold Pressure Measurement

To correctly measure manifold pressure, follow the steps below:

1. Remove the threaded plug from the outlet side of the gas valve and install a field-provided barbed fitting. Connect measuring device "+" connection to barbed fitting to measure manifold pressure.
2. Start unit on low heat and allow 5 minutes for unit to reach steady state.
3. After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in Table 29.
4. Repeat on high heat.
5. Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to remove barbed fitting and replace threaded plug.
6. Start unit and perform leak check. Seal leaks if found.

Proper Combustion

Furnace should operate minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue outlet and compare to Table 30.

Model	CO ₂ % for Nat	
	Low Fire	High Fire
040	6.3 - 7.8	6.3 - 7.8
060	6.5 - 8.2	6.5 - 8.2
080	7.2 - 8.4	7.2 - 8.4
The maximum carbon monoxide reading should not exceed 100 ppm.		

Table 30.

High Altitude Information

Maximum altitude for -040 units is 4,500 ft. above sea level. Maximum altitude for -060 and -080 units is 7,500 ft. above sea level. See Table 29 for de-rate manifold values.

Other Unit Adjustments

NOTE: See troubleshooting flow charts if any safety switches are found to be open.

Primary Limit

The primary limit is located on the heating compartment vestibule panel. This limit is factory set and requires no adjustment.

Roll Out Switch

This auto-reset switch is located on the front of the intake air elbow.

Pressure Switch

The pressure switch is located in the heating compartment on the cold end header box. This switch checks for proper combustion air inducer operation before allowing ignition trial. The switch is factory-set and must not be adjusted.

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 21 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.

Electrical

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

Unit Nameplate _____ Actual _____

Exhaust and Air Intake Pipe

1. Check exhaust and air intake connections for tightness and to make sure there is no blockage.
2. Is pressure switch closed? Obstructed exhaust pipe will cause unit to shut off at pressure switch. Check termination for blockages.
3. Obstructed pipe or termination may cause rollout switch to open. Check termination for blockages.

Heating Sequence of Operation

Electronic Ignition

The two-stage, variable speed integrated control used in NF97X***V**R units has an added feature of an internal soft lockout control. The feature serves as an automatic reset device for ignition control lockout caused by ignition failure. After one hour of continuous thermostat demand for heat, the soft lockout feature will break and remake thermostat demand to the furnace and automatically reset the control to begin the ignition sequence.

NOTE: The ignition control thermostat selection DIP switch is factory-set in the "TWO-STAGE" position.

Applications Using a Two-Stage Thermostat

See Figure 54 for ignition control sequence

A - Heating Sequence -- Integrated Control Thermostat Selection DIP Switch 1 OFF in "Two-Stage" Position (Factory Setting)

1. On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at low speed.
2. Once the control receives a signal that the low pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in low speed.
NOTE: If the low fire pressure switch does not close the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.
3. After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at low speed.
4. After the 20-second warm-up period has ended, the gas valve is energized on low fire (first stage) and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 30-second ON-delay. When the delay ends, the indoor blower motor is energized on the low fire heating speed, the HUM contacts close energizing the humidifier and 120V ACC terminal is energized. The furnace will continue this operation as long as the thermostat has a first-stage heating demand.
5. If second-stage heat is required, the thermostat second-stage heat contacts close and send a signal to the integrated control. The integrated control initiates a 30-second second-stage recognition delay.

6. At the end of the recognition delay, the integrated control energizes the combustion air inducer at high speed. The control also checks the high fire (second stage) pressure switch to make sure it is closed. The high fire (second stage) gas valve is energized and the indoor blower motor is energized for operation at the high fire heating speed.
7. When the demand for high fire (second stage) heat is satisfied, the combustion air inducer is switched to the low-fire heating speed and the high-fire (second stage) gas valve is de-energized. The low-fire (first stage) gas valve continues operation. The indoor blower motor is switched to the low-fire heating speed.
8. When the thermostat demand for low-fire (first stage) heat is satisfied, the gas valve is de-energized and the field-selected indoor blower off delay begins. The combustion air inducer begins a 5-second post-purge period.
9. When the combustion air post-purge period is complete, the inducer and the HUM contacts are de-energized. The indoor blower is de-energized at the end of the off delay as well as the 120V ACC terminals.

Applications Using A Single-Stage Thermostat
See Figure 55 for ignition control sequence

B - Heating Sequence -- Integrated Control Thermostat Selection DIP Switch 1 ON in "Single-Stage" Position

NOTE: In these applications, two-stage heat will be initiated by the integrated control if heating demand has not been satisfied after the field adjustable period (7 or 12 minutes).

1. On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at low speed.
2. Once the control receives a signal that the low pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in low speed.

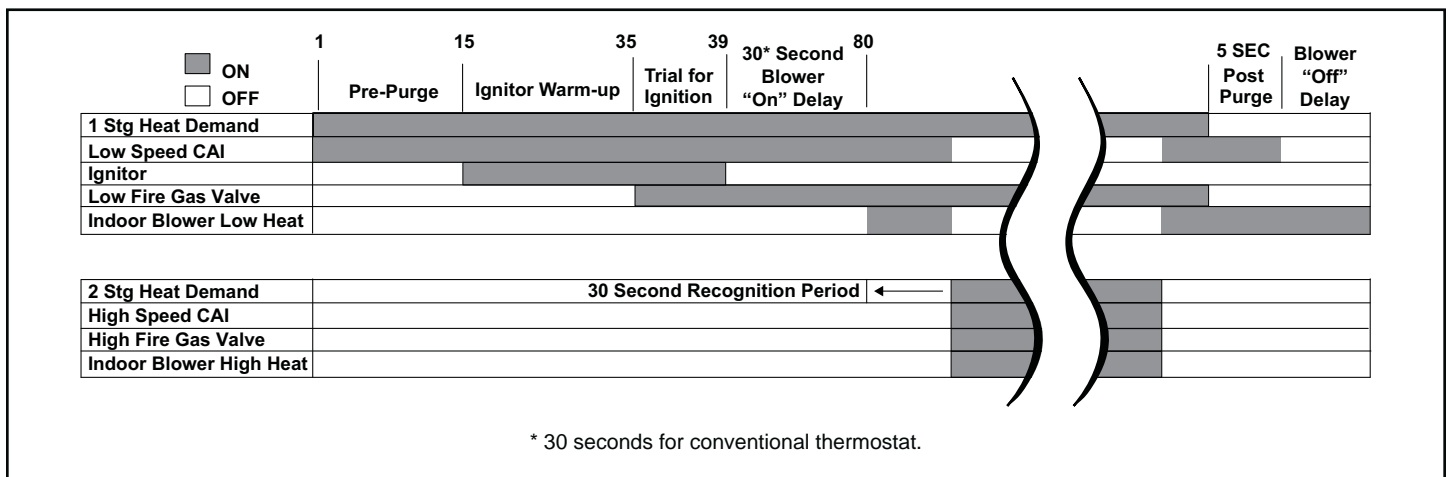


Figure 52. Heating Operation with Two Stage Thermostat

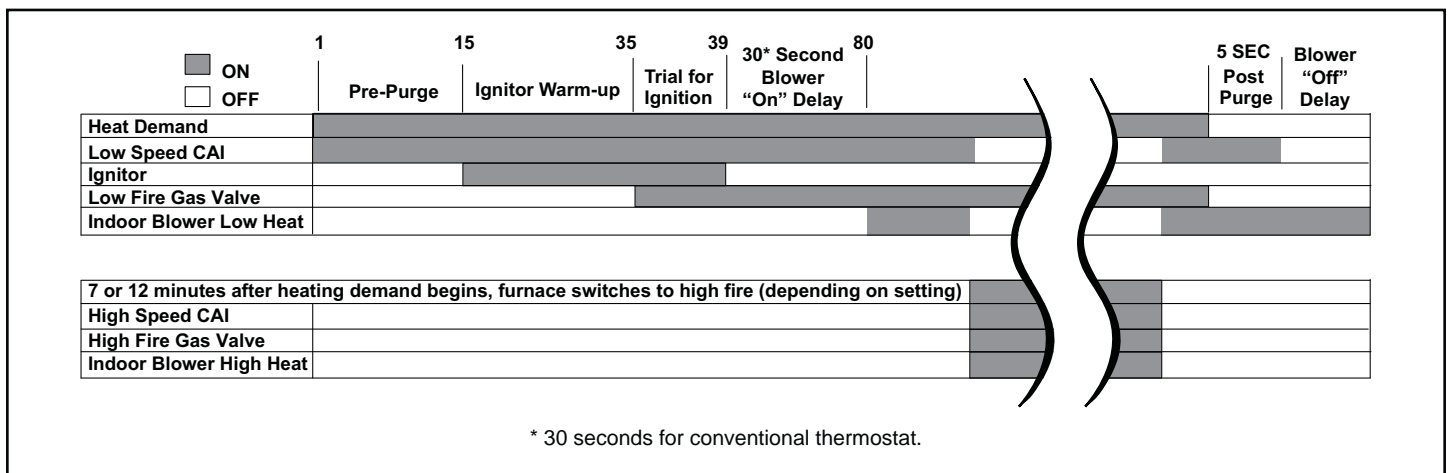


Figure 53. Heating Operation with Single Stage Thermostat

NOTE: *If the low fire pressure switch does not close the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.*

3. After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at low speed.
4. After the 20-second warm-up period has ended, the gas valve is energized on low fire (first stage) and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 30-second ON-delay. When the delay ends, the indoor blower motor is energized on the low fire heating speed and the HUM contacts are energized. The integrated control also initiates a second-stage on delay (factory-set at 7 minutes; adjustable to 12 minutes).
5. If the heating demand continues beyond the second-stage on delay, the integrated control energizes the combustion air inducer at high speed. The control also checks the high fire (second stage) pressure switch to make sure it is closed. The high fire (second stage) gas valve is energized and the indoor blower motor is energized for operation at the high fire heating speed.
6. When the thermostat heating demand is satisfied, the combustion air inducer begins a 5-second low speed post-purge. The field-selected indoor blower off delay begins. The indoor blower operates at the low-fire heating speed.
7. When the combustion air post-purge period is complete, the inducer and the HUM contacts are de-energized. The indoor blower is de-energized at the end of the off delay as well as the 120V ACC terminals.

Service

WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD.

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

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

Before servicing, disconnect all electrical power to furnace.

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

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.

Annual Furnace Maintenance

At the beginning of each heating season, and to comply with the GE Appliances Limited Warranty, your system should be checked as follows:

1. Check wiring for loose connections, voltage at indoor unit and amperage of indoor motor.
2. Inspect all gas pipe and connections for leaks.
3. Check the cleanliness of filters and change if necessary (monthly).
4. Check the cleanliness of blower assembly and clean the housing, blower wheel and blower motor if necessary.
5. Inspect the condensate drain and trap for leaks and cracks. Check any additional traps such as in the crawl space exhaust. The drain and trap must also be cleaned and the trap must be primed with water.
6. Remove the rubber hoses from the cold end header box and inspect for any blockage, clean as needed. If strainers are installed in the hoses remember to remove and clean before reinstalling the hoses.
7. Evaluate the heat exchanger and combustion chamber integrity by inspecting the heat exchanger per the AHRI heat exchanger inspection procedure. This procedure can be viewed at www.ahrinet.org. See Induced-draft Furnace Heat Exchanger Inspection Procedure.

8. Ensure sufficient combustion air is available to the furnace. Fresh air grilles and louvers (on the unit and in the room where the furnace is installed) must be properly sized, open and unobstructed to provide combustion air.
9. Inspect the furnace intake and exhaust pipes to make sure they are in place, structurally sound, without holes, blockage or leakage and the exhaust pipe is sloped toward the furnace. Inspect terminations to ensure they are free of obstructions and are structurally sound. If applicable, inspect and clean air intake screen. Inspect the furnace return air duct connection to ensure the duct is sealed to the furnace.
10. Inspect the furnace return air duct connection to ensure the duct is sealed to the furnace. Check for air leaks on supply and return ducts and seal where necessary.
11. Check the condition of the furnace cabinet insulation and repair if necessary.
12. Perform a complete combustion analysis during the furnace inspection to ensure proper combustion and operation. Consult Service Literature for proper combustion values.
13. Verify operation of smoke detectors and CO detectors and replace batteries as required.
14. Inspect the Low GWP sensor / sensors and rubber sleeve.

Perform a general system test. Turn on the furnace to check operating functions such as the start-up and shut-off operation.

1. Check the operation of the ignition system, inspect and clean flame sensor. Check micro amps before and after. Check controls and safety devices (gas valve, flame sensor, temperature limits). Consult Service Manual for proper operating range. Thermal Limits should be checked by restricting airflow and not disconnecting the indoor blower. For additional details, please see Service and Application Note H049.
2. Verify that system total static pressure and airflow settings are within specific operating parameters.
3. Clock gas meter to ensure that the unit is operating at the specified firing rate. Check the supply pressure and the manifold pressure. **If manifold pressure adjustment is necessary, consult the Service Literature for unit specific information on adjusting gas pressure. Not all gas valves are adjustable.** Verify correct temperature rise.

Winterizing and Condensate Trap Care

1. Turn off power to the furnace.
2. Have a shallow pan ready to empty condensate water.
3. Remove the clean out cap from the condensate trap and empty water. Inspect the trap then reinstall the clean out cap.

Low GWP Refrigerant detection System Parts

- Inspect the Low GWP sensor / sensors and rubber sleeve.

Repair Parts List

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

Cabinet Parts

- Outer access panel
- Blower access panel
- Top cap

Control Panel Parts

- Transformer
- Integrated control board
- Door interlock switch

Blower Parts

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

Heating Parts

- Flame sensor
- Heat exchanger assembly
- Gas manifold assembly
- Combustion air inducer
- Gas valve
- Burner assembly
- Pressure switches
- Ignitor
- Primary limit control
- Rollout switch

Refrigerant Detection System Parts

- Refrigerant Detection Sensor
- Refrigerant Line Set Sleeve

Power-Up - Number displayed represents by integrated control unit size code (furnace model and capacity). If three horizontal bars are displayed followed by continuous E203, furnace control does not recognize **unit size code**. Configure per the following:

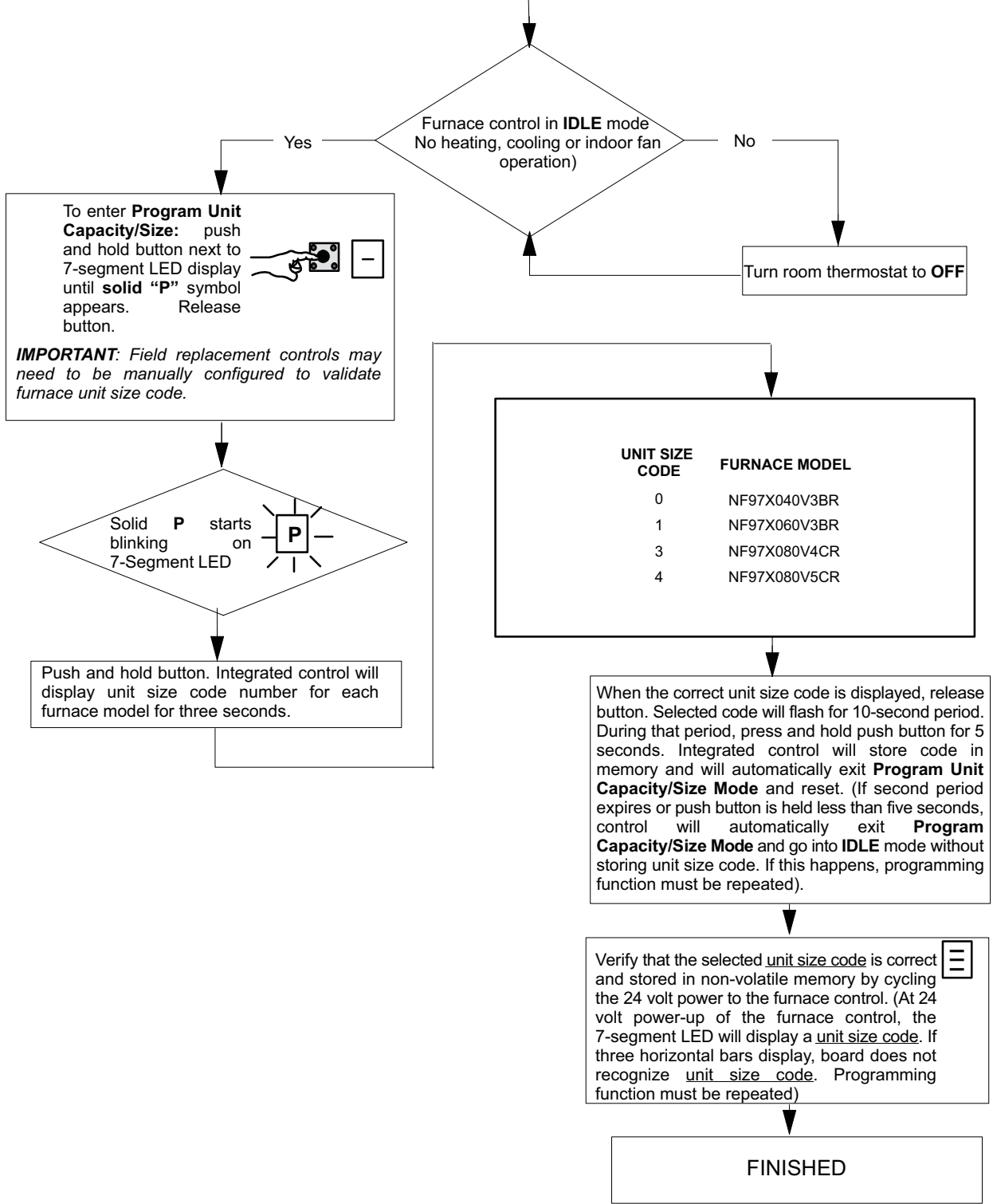
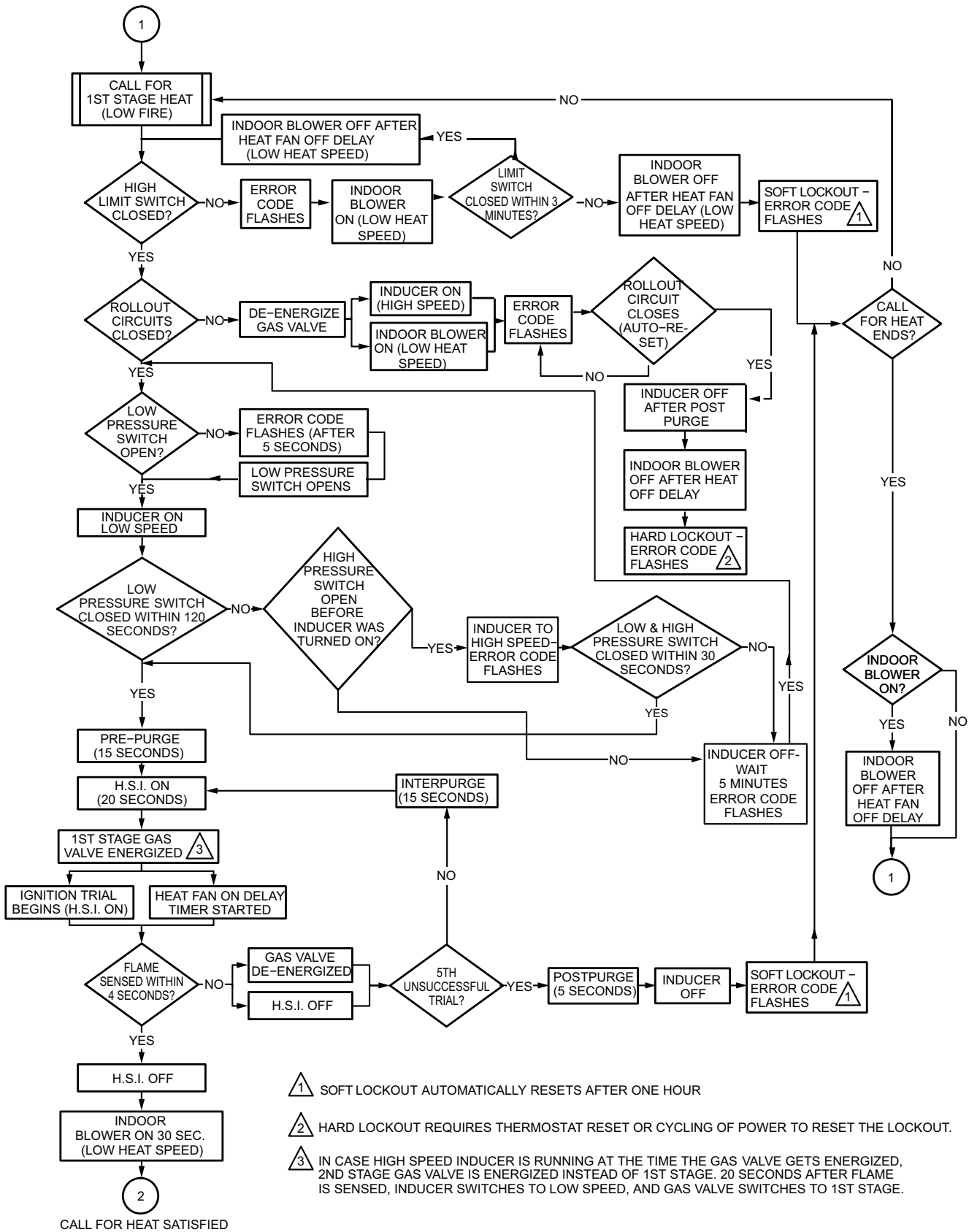


Figure 54. Program Unit Capacity/Size Mode

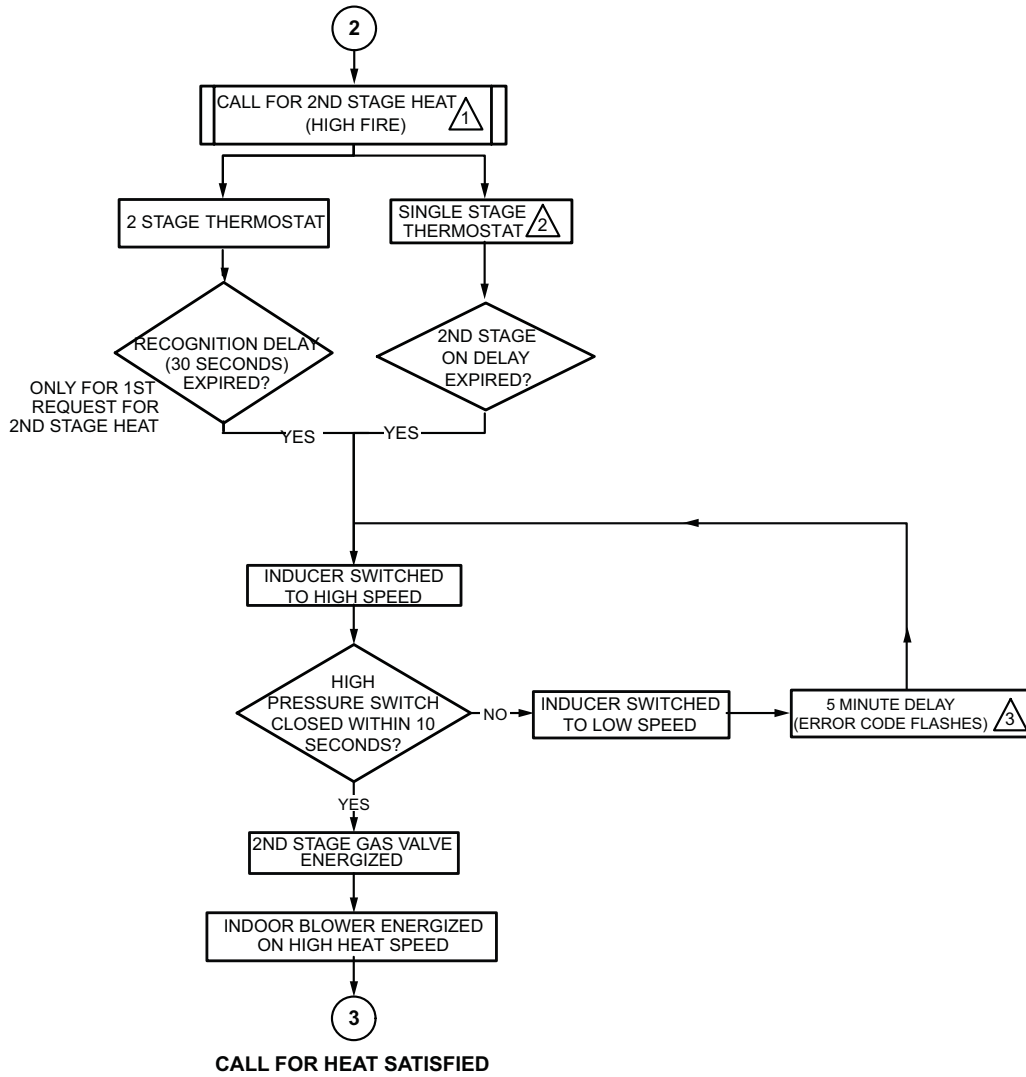
CALL FOR FIRST-STAGE HEAT



- 1 SOFT LOCKOUT AUTOMATICALLY RESETS AFTER ONE HOUR
- 2 HARD LOCKOUT REQUIRES THERMOSTAT RESET OR CYCLING OF POWER TO RESET THE LOCKOUT.
- 3 IN CASE HIGH SPEED INDUCER IS RUNNING AT THE TIME THE GAS VALVE GETS ENERGIZED, 2ND STAGE GAS VALVE IS ENERGIZED INSTEAD OF 1ST STAGE. 20 SECONDS AFTER FLAME IS SENSED, INDUCER SWITCHES TO LOW SPEED, AND GAS VALVE SWITCHES TO 1ST STAGE.

Figure 55. Troubleshooting: Heating Sequence of Operation

CALL FOR SECOND-STAGE HEAT



- 1 SYSTEM WILL ALWAYS LIGHT ON LOW FIIRE, EVEN IF 2ND STAGE HEAT IS IN PLACE.
- 2 WHEN USED WITH A SINGLE STAGE THERMOSTAT, SET SW1 TO THE ON POSITION IN DIP SWITCH S4.
- 3 IF THE HIGH FIRE PRESSURE SWITCH DOES NOT CLOSE WITHIN 5 ATTEMPTS, THE SYSTEM WILL OPERATE AT LOW FIRE FOR THE REMAINDER OF THE CALL FOR HEAT REQUEST.

Figure 56. Troubleshooting: Heating Sequence of Operation

CALL FOR HEAT SATISFIED

FIRST-STAGE HEAT SECOND-STAGE HEAT

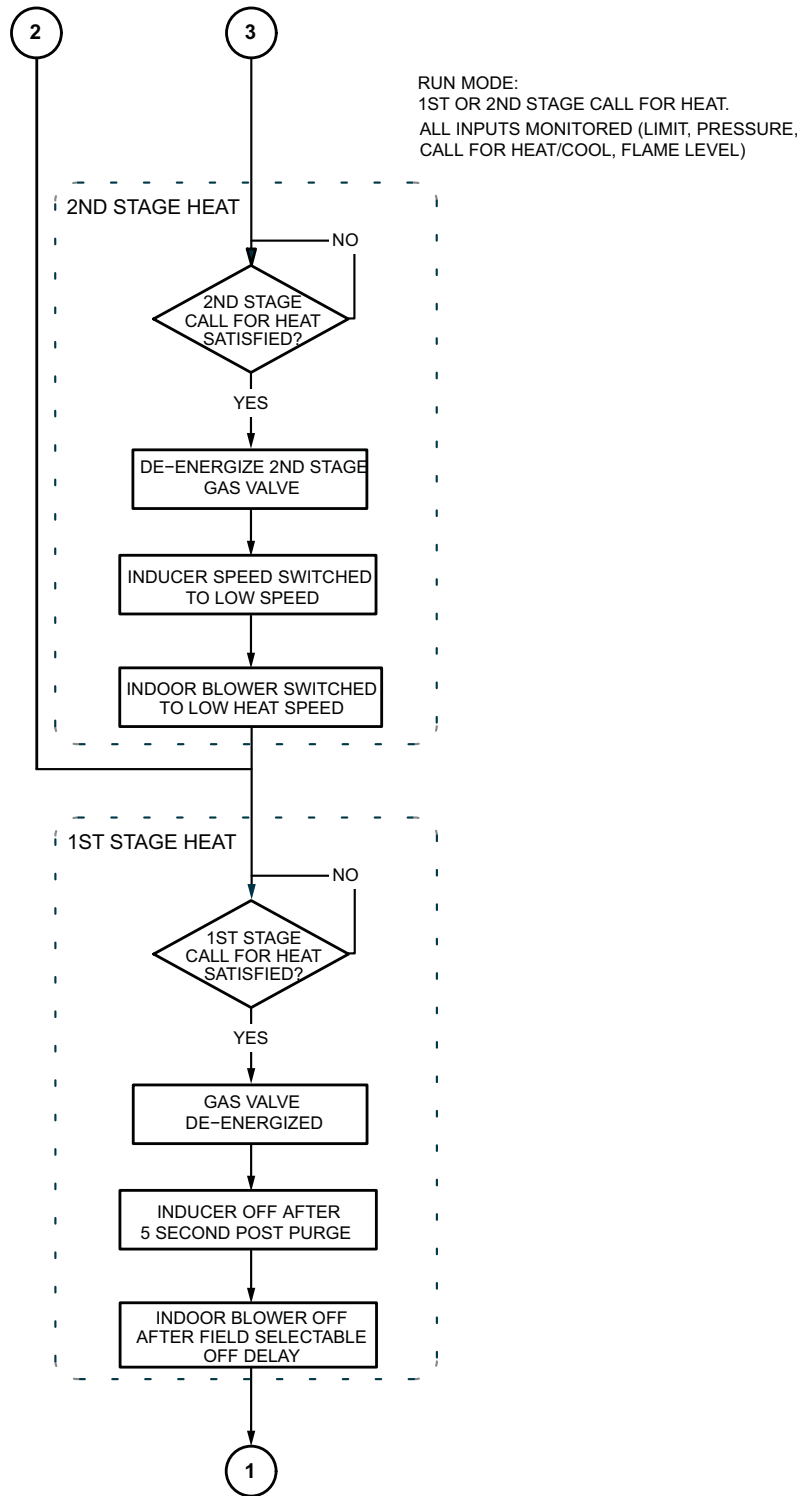


Figure 57. Troubleshooting: Heating Sequence of Operation

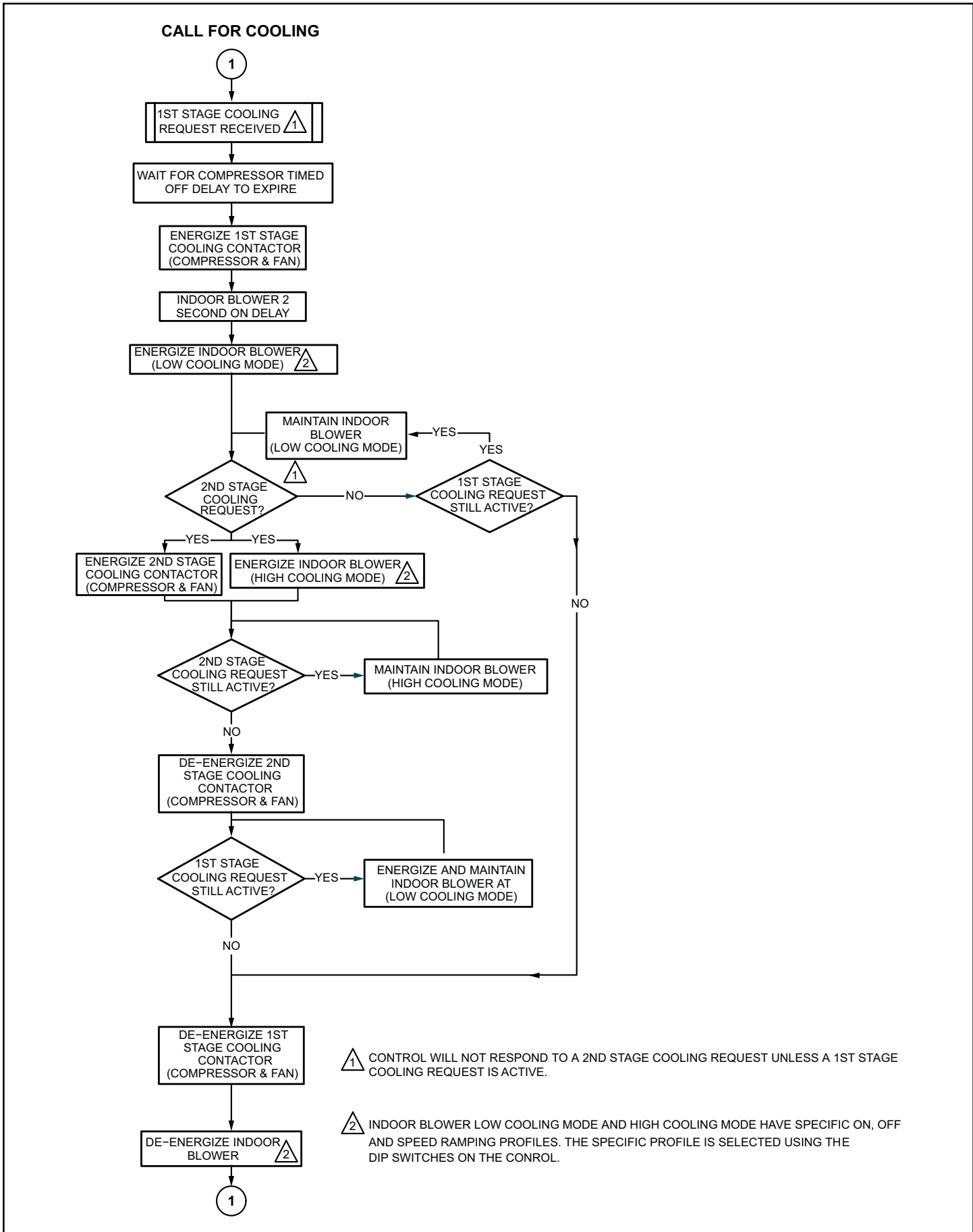


Figure 58. Troubleshooting: Cooling Sequence of Operation

CALL FOR FAN

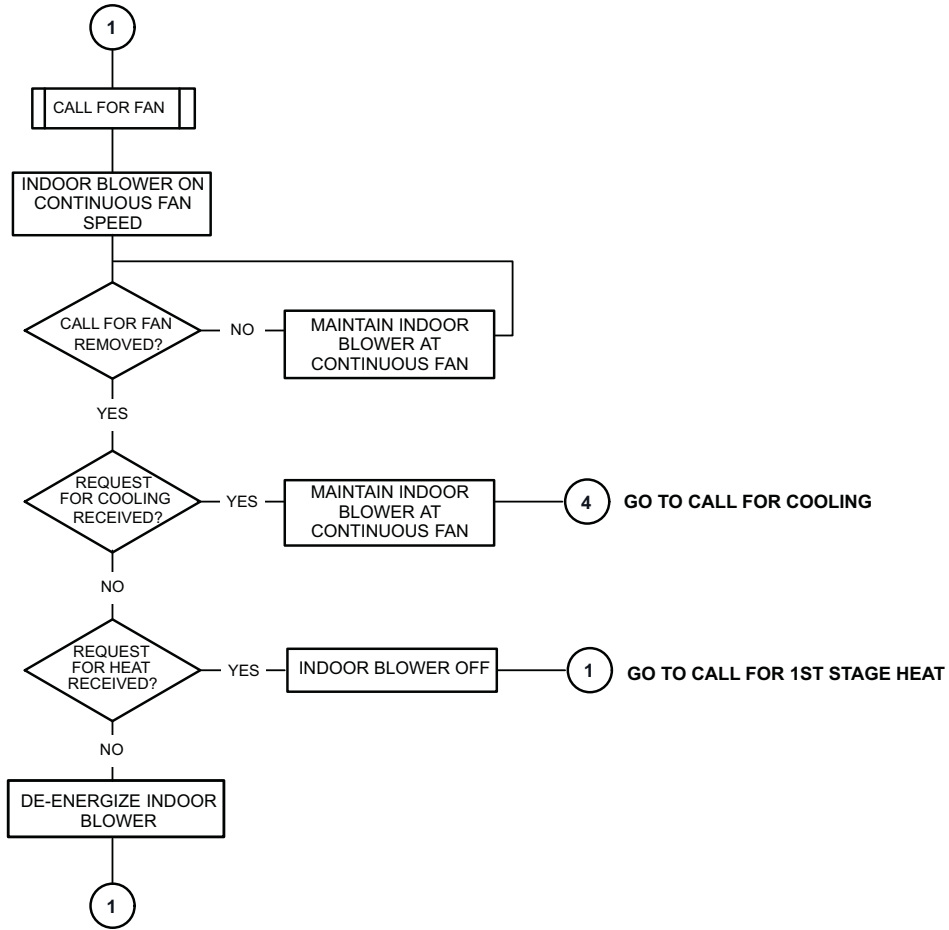


Figure 59. Troubleshooting: Continuous Fan Sequence of Operation

Requirements for Commonwealth of Massachusetts

Modifications to NFPA-54, Chapter 10

Revise NFPA-54 section 10.8.3 to add the following requirements:

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

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

4. **INSPECTION.** The state or local gas inspector of the side wall, horizontally vented, gas-fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

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

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

MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM PROVIDED.

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

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

MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED.

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

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

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