

INSTALLATION INSTRUCTIONS

G2D93CT, G2D93CU, G2D95CT, & G2D95CU

High Efficiency Multiposition Gas Furnace with System Sentry™ Control System

Save these instructions for future reference

WARNING

Improper installation, adjustment, alteration, service, or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information, consult a qualified installer, service agency, or the gas supplier.

WARNING

Do not store combustible materials, including gasoline and other flammable vapors and liquids, near the furnace, vent pipe, or warm air ducts. The homeowner should be cautioned that the furnace area must not be used as a broom closet or for any other storage purposes. Such uses may result in actions that could cause property damage, personal injury, or death.

WARNING

This furnace is not approved for installation in a mobile home. Do not install this furnace in a mobile home. Installation in a mobile home could result in actions that could cause property damage, personal injury, or death.

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Manufactured By
Allied Air Enterprises Inc.
A Lennox International Inc. Company
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IMPORTANT

The installation of the furnace, wiring, warm air ducts, venting, etc. must conform to the requirements of the National Fire Protection Association; the National Fuel Gas Code, ANSI Z223.1/NFPA No. 54 (latest edition) and the National Electrical Code, ANSI/NFPA No. 70 (latest edition) in the United States; CSA B149.1 (latest edition) Natural Gas and Propane Installation Codes and the Canadian Electrical Code Part 1, CSA 22.1 (latest edition) in Canada; and any state or provincial laws, local ordinances (including plumbing or wastewater codes), or local gas utility requirements. Local authorities having jurisdiction should be consulted before installation is made. Such applicable regulations or requirements take precedence over the general instructions in this manual.

IMPORTANT SAFETY INFORMATION

The following is a list of safety rules and precautions that must be followed when installing this furnace.

1. Use only with the type of gas approved for this furnace. Refer to the furnace rating plate.
2. Install this furnace only in a location and position as specified in the **Location** section on page 3 of these instructions.
3. Provide adequate combustion and ventilation air to the furnace space as specified in the **Combustion and Ventilation Air** section on page 4 of these instructions.
4. Adequate clearance must be provided around the vent-air intake terminals as specified in the **Venting** section beginning on page 5 of these instructions.
5. Combustion products must be discharged outdoors. Connect this furnace to an approved vent system only, as specified in the **Venting** section beginning on page 5 of these instructions.
6. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified in **Gas Supply and Piping** beginning on page 20 of these instructions.
7. Always install furnace to operate within the furnace's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified in **Temperature Rise** on page 31 of these instructions. See furnace rating plate.
8. When a furnace is installed so that the supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by duct(s) sealed to the furnace casing and terminating outside the space containing the furnace. See **Circulating Air Supply** on page 19 of these instructions.
9. A gas-fired furnace for installation in a residential garage must be installed as specified in the **Location** section on page 3 of these instructions.
10. The furnace is permitted to be used for temporary heating of buildings or structures under construction as specified in the **Location** section beginning on page 3 of these instructions.

In the State of Massachusetts:

This product must be installed by a licensed Plumber or Gas Fitter. When flexible connectors are used, the maximum length shall not exceed 36". When lever-type gas shutoffs are used, they shall be T-handle type.

INSTALLATION

These instructions must be placed on or near the furnace in a conspicuous place.

The furnace design is certified by CSA International as a Category IV furnace in compliance with the latest edition of American National Standard Z21.47/CSA Standard 2.3 for Gas-Fired Central Furnaces, for operation with natural gas or propane. Consult the rating plate on the furnace for gas type before installing.

The maximum hourly heat loss of space shall be calculated in accordance with the procedure described in the current manuals of Air Conditioning Contractors of America, or by any other recognized method which is suitable for local conditions, provided the results obtained are in substantial agreement with, and not less than, those obtained using the procedure described in the manuals.

G2D93CT and G2D95CT furnaces may be installed as **upflow** or **horizontal right to left or left to right ariflow furnaces**. When installed horizontally, the installer must install a sheet metal screw to retain the upper door as shown in Figure 1.

G2D93CU and G2D95CU furnaces must be installed only as upflow furnaces.

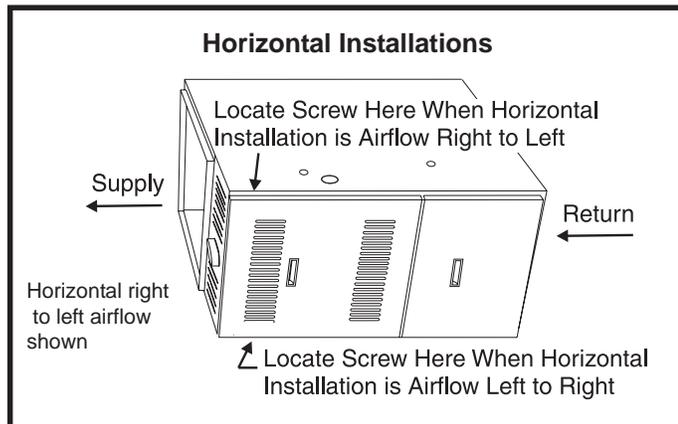


Figure 1

Never install any furnace on its back.

Inspection of Shipment

This furnace is shipped in one package, completely assembled and wired. The thermostat is shipped in a separate carton when ordered.

Upon receipt of equipment, carefully inspect it for possible shipping damage. If damage is found, it should be noted on the carrier's freight bill. Damage claims should be filed with the carrier immediately. Claims of shortages should be filed with the seller within 5 days.

Location

To provide proper operation and satisfactory performance, care must be taken in choosing the location for this furnace. The atmosphere in which the furnace operates must be free of contaminants such as chlorides and sulfates.

The furnace must be installed so that electrical components are protected from water. **Unit must be level for proper condensate drainage.**

CAUTION

The condensate system must not be exposed to temperatures under 32°F. The condensate system must be insulated if exposed to temperatures under 32°F. Use of heat tape is permissible provided the rate temperature of the tape **does not exceed 155°F.**

To avoid property damage caused by condensate drain blockage, install a field-fabricated auxiliary drain pan with a separate drain line to the outside under the entire furnace and drain system. Install according to local codes.

All models are suitable for closet or utility room installation.

The furnace is suitable for installation in buildings constructed on-site. The furnace should be centralized in respect to the heat distribution system as much as practicable. When installed in a utility room, the door should be wide enough to allow the largest part of the furnace to enter, or permit the replacement of another appliance, such as a water heater.

A gas-fired furnace for installation in a residential garage must be installed so the burner(s) and the ignition source are located not less than 18" above the floor. The furnace is to be located or protected to avoid physical damage by vehicles.

This furnace is not recommended to be used as a construction heater during any phase of construction. Very low return air temperatures, harmful vapors, and operation of the unit with clogged or misplaced filters will damage the unit.

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

- The vent system must be permanently installed per these installation instructions.
- A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is not allowed.

- The return air duct must be provided and sealed to the furnace.
- Return air temperature range between 60°F and 80°F must be maintained.
- Air filters must be installed in the system and must be maintained during construction.
- Air filters must be replaced upon construction completion.
- The input rate and temperature rise must be set per the furnace rating plate.
- One hundred percent (100%) outdoor air must be provided for combustion air requirements during construction. Temporary ducting may supply outdoor air to the furnace. Do not connect duct directly to the furnace. Size the temporary duct following the instructions given on this page in the **Combustion and Ventilation Air** section regarding confined space with air from outside.
- The furnace heat exchanger, components, duct system, air filters, and evaporator coils must be thoroughly cleaned following final construction cleanup.
- All furnace operating conditions (including ignition, input rate, temperature rise, and venting) must be verified according to these installation instructions.

G2D93CT and G2D95CT models installed in the horizontal position are approved for attic installations. **If the furnace is to be installed in an attic or other insulated space, it must be kept free and clear of insulating materials.**

Clearances

All servicing and cleaning of the furnace can be performed from the front. If installed in a closet or utility room, provide 18" clearance in front for service if the door to the room is not in line with the front of the furnace.

Refer to Table 1 for the minimum clearances to combustibles required for construction and proper unit operation. Where servicing clearances are greater than clearances to combustibles, servicing clearances take precedence.

G2D93CT and G2D95CT models may be installed on wood flooring but shall not be installed directly on carpeting, tile, or any other combustible material.

Combustion and Ventilation Air

Adequate provisions for combustion air and ventilation of furnace must be made. Refer to Section 5.3, "Air for

	Upflow	Horizontal
Sides	0"	0"
Rear	0"	0"
Front	2"	18"
Flue Pipe	0"	0"
Plenum	1"	1"

Table 1

Combustion and Ventilation," of the National Fuel Gas Code, ANSI Z223.1/NFPA54 (latest edition), Sections 7.2, 7.3, or 7.4 of CSA B149.1 Natural Gas and Propane Installation Codes (latest editions), or applicable provisions of the local building codes.

⚠ WARNING

Insufficient combustion air can cause headaches, nausea, dizziness, or asphyxiation. When considering combustion air requirements, enough air must also be provided to meet the needs of all fuel-burning appliances and exhaust fans.

⚠ WARNING

Air openings in the front of the furnace must be kept free of obstructions. Any obstruction may cause improper operation that can result in a fire hazard or carbon monoxide injury.

Unconfined Space

An unconfined space is defined as "a space whose volume is more than 50 cubic feet per 1000 BTU per hour of the combined input rating of all appliances installed in that space." When a furnace is installed in an unconfined space in a building, it can be assumed that the infiltration will be sufficient to supply the required air. If the furnace is installed in a ventilated attic or crawl space, it is assumed that the infiltration is sufficient to supply the required air. However, in a building of unusually tight construction, additional outdoor air should be provided.

Confined Space

A confined space is defined as "a space whose volume is less than 50 cubic feet per 1000 BTU per hour of the combined input rating of all appliances installed in that space."

If the furnace is installed in a confined space within the building and combustion air is taken from a heated space, the combustion air and ventilating air must enter and leave the space through two permanent openings of equal area. One opening shall be located within 12" of the ceiling and the other within 12" of the floor, each having a free area of 1 square inch per 1000 BTU/HR of total input rating of all appliances within the space and not less than 100 square inches each.

If the furnace is installed in a space within a building of tight construction, makeup air must be supplied from outdoors. In this case, one opening shall be within 12" of the ceiling and one opening within 12" of the floor. If combustion ducts are vertical, each opening shall have a free area of 1 square inch per 4000 BTU/HR of the total input rating of all appliances within the enclosure. If horizontal combustion ducts are run, 1 square inch per 2000 BTU/HR is required.

Contaminated Combustion Air

Excessive exposure to contaminated combustion air will result in safety and performance related problems. The recommended source of combustion air is outdoor air. However, the use of indoor air in most applications is acceptable if the following guidelines are followed:

1. If the furnace is installed in a confined space, it is recommended that the necessary combustion air come from the outdoors by way of an attic, crawl space, air duct, or direct opening.
2. If indoor combustion air is used, there must be no exposure to the substances listed in Item 5.
3. All provisions for indoor combustion air must meet the requirements for combustion air indicated in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 (latest edition), and/or any applicable local codes. In Canada, see CSA B149.1, Natural Gas and Propane Installation Codes (latest edition).
4. The following types of installation may require **outdoor air** for combustion, due to chemical exposures:
 - Commercial buildings
 - Buildings with indoor pools
 - Furnaces installed in laundry rooms
 - Furnaces installed in hobby or craft rooms
 - Furnaces installed near chemical storage areas

5. Exposure to the following substances in the combustion air supply may also require **outdoor air** for combustion:

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

Venting

The high efficiency of this furnace is accomplished by the removal of both sensible and latent heat from the flue gases. The removal of latent heat results in the condensation of moisture in the flue gases. This condensation occurs in the secondary heat exchanger and in the vent system. Therefore, this furnace requires special venting considerations and the instructions must be followed to insure proper operation. All venting must be in accordance with the codes having jurisdiction in the area and these instructions.

G2D93CT, G2D93CU, G2D95CT, and G2D95CU models can be installed as either direct vent or non-direct vent units. A direct vent (two pipe) installation requires that all the air necessary for combustion be supplied from outside the dwelling through an air intake pipe. A non-direct vent (one pipe) installation uses air from inside the dwelling for combustion.

The furnace is shipped with the air inlet pipe terminated to the top panel for either inside or outside combustion air. An inlet air restrictor plate (see Figure 2 on page 6) is supplied with this furnace and can be found in the plastic bag containing these Installation Instructions and the User's Information Manual. **This inlet restrictor plate must be used in all installations using inside air for combustion (non-direct vent).**

The inlet restrictor plate must be installed in the air inlet in one of three ways:

- **Restrictor plate in inlet collar:** Install the restrictor plate in the inlet pipe collar in the top panel of the furnace. Insert a 3" to 36" section of PVC pipe (field supplied) into the collar. Use high temperature RTV sealant to attach PVC pipe to collar. A 90° elbow (field supplied) may be attached to the PVC pipe, but the elbow is not required. Use high temperature RTV sealant to attach elbow to PVC pipe (if applicable).

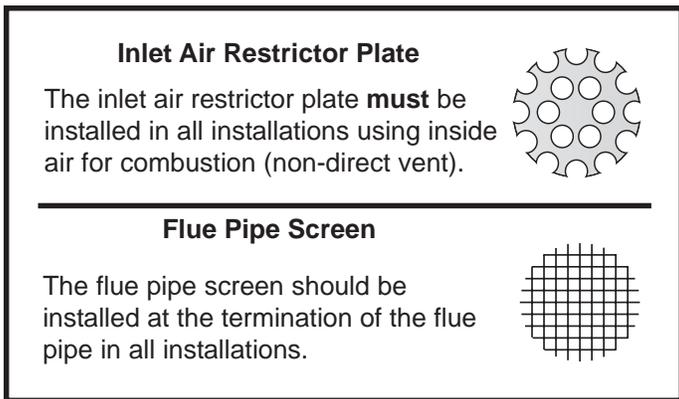


Figure 2

- **Restrictor plate in inlet pipe:** Insert a 3" to 36" section of PVC pipe (field supplied) into the collar. Use high temperature RTV sealant to attach PVC pipe to collar. Install the restrictor plate in the end of the inlet pipe just installed. Attach either a field-supplied coupler or 90° elbow to the end of the PVC pipe to keep the restrictor plate in place. Use high temperature RTV sealant to attach the coupler or elbow to PVC pipe.
- **Restrictor plate in elbow:** Insert a 3" to 36" section of PVC pipe (field supplied) into the collar. Use high temperature RTV sealant to attach PVC pipe to collar. Attach a 90° elbow (field supplied) to the PVC pipe. Use high temperature RTV sealant to attach elbow to PVC pipe. Install the restrictor plate into the elbow.

⚠ WARNING

If at any time in the future the installation of this furnace is changed to require outside fresh air for combustion, the inlet air restrictor plate must be removed. Failure to remove the inlet air restrictor could cause improper operation that can result in a fire hazard or carbon monoxide injury.

Two different sized inlet restrictor plates are supplied with the furnace (2" and 3"). Use the proper restrictor plate for the furnace model.

Also included in the plastic bag containing the inlet air restriction plate is a flue pipe screen (see Figure 2). In all installations, this screen should be installed at the termination of the flue pipe and is designed to keep objects out of the flue pipe.

For either type of installation (direct or non-direct vent), special venting considerations must be followed. Refer to the proper section in pages 11 – 15 for the type of furnace and venting being installed.

The venting system must be supported with mounting straps to prevent any weight load from being applied to the vent blower. Horizontal vent pipe must be supported every 5' and vertical pipe should be supported every 10' to prevent sagging and provide rigid support.

When a furnace is installed as direct vent, provisions for ventilation air should follow the same requirements as if installed as non-direct vent. Proper ventilation air is necessary to maintain furnace component temperatures within acceptable limits.

All vents passing through floors, ceilings, and walls must be installed in accordance with National Fuel Gas Code, ANSI Z223.1/NFPA 54 (latest edition).

The length of flue pipe exposed to outdoor conditions should be kept to a minimum. When the installation requires more than 3 feet of flue pipe be exposed to outdoor conditions, insulating the exposed flue pipe with 1/2" Armaflex or equivalent is recommended. In climates with design temperatures below zero degrees (F), 3/4" Armaflex or equivalent is recommended.

Materials

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 Table 2 for approved piping and fitting materials.

Canadian Applications Only:

PVC pipe, fittings, primer and solvent cement used to vent this appliance must be certified to ULC S636 and supplied by a single manufacturer as part of an approved venting system. In addition, the first three feet of vent pipe from the furnace flue collar must be accessible for inspection. Models that may be installed as a horizontal furnace include a horizontal drain kit. In Canada this drain kit must be replaced by a locally available IPEX Drain Kit #196014. For Local IPEX Canadian Customer Service Center and Kit availability call IPEX at 1-866-473-9462.

The primers and solvents used must also meet ASTM specifications. PVC primer is specified in ASTM F656. Use PVC solvent as specified in ASTM D2564 and ABS solvent cement as specified ASTM D2235. Low temperature solvent cement is recommended. Metal or plastic strapping may be used for vent pipe hangers.

Piping and Fitting Specifications

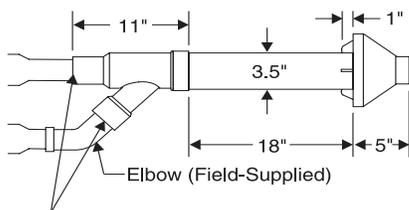
Piping & Fitting Material	ASTM Specification
Schedule 40 PVC (Pipe)	D1785
Schedule 40 PVC (Cellular Core Pipe)	F891
Schedule 40 PVC (Fittings)	D2466
SDR-26 (Pipe)	D2241
SDR - 26 CPVC (Pipe)	F442
Schedule 40 ABS Cellular Core DWV (Pipe)	F628
Schedule 40 ABS (Pipe)	D1527
Schedule 40 ABS (Fittings)	D2468
Schedule 40 & 80 CPVC (Pipe)	F441
Schedule 40 & 80 CPVC (Fittings)	F438
ABS-DWV Drain Waste & Vent (Pipe & Fittings)	D2661
PVC-DWV Drain Waste & Vent (Pipe & Fittings)	D2665

Table 2

When making ABS joints, pieces can be prepared with a clean dry cloth to clean inside socket surface of fitting and male end of pipe to depth of socket. Refer to procedure specified in ASTM D3138. When joining ABS to PVC materials, use transition solvent.

Preferred fittings are DWV style or long sweep. Seal all joints gas tight with appropriate cement. In areas where vent and air intake pipes are exposed to abnormal stress or are subject to damage, schedule 80 pipe should be used.

Concentric Vent Kit Dimensions



2" nominal pipe size. For 3" venting, use (2) 3" x 2" Schedule 40 PVC reducers.

Figure 3

Category IV Furnace Limitations

This furnace shall **not** be connected to any Type B, BW, or L vent or vent connector and shall **not** be connected to any portion of a factory-built or masonry chimney. **This furnace is not to be common vented with any other appliance. The vent pipe must not be connected to a chimney flue serving a separate appliance designed to burn solid fuel.**

Vent Tables *

(numbers in inches unless specified otherwise)

Minimum Pipe Diameter 40,000 – 60,000 BTU/HR Models

Vent Pipe Length (ft.)	Number of 90° Elbows									
	0	1	2	3	4	5	6	7	8	9
5	1.5	1.5	2	2	2	2	2	2	2	2
10	1.5	2	2	2	2	2	2	2	2	2
20	2	2	2	2	2	2	2	2	2	2.5
30	2	2	2	2	2	2	2	2.5	2.5	2.5
40	2	2	2	2	2	2.5	2.5	2.5	2.5	2.5
50	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3
60	2	2.5	2.5	2.5	2.5	2.5	2.5	3	3	3
70	2.5	2.5	2.5	2.5	2.5	3	3	3	3	NR
80	2.5	2.5	2.5	3	3	3	3	3	NR	NR
90	2.5	2.5	3	3	3	3	3	NR	NR	NR

Minimum Pipe Diameter 80,000 – 100,000 BTU/HR Models

Vent Pipe Length (ft.)	Number of 90° Elbows									
	0	1	2	3	4	5	6	7	8	9
5	NR	2	2	2	2	2	2	2.5	2.5	2.5
10	2	2	2	2	2	2	2.5	2.5	2.5	2.5
20	2	2	2	2	2	2.5	2.5	2.5	2.5	3
30	2	2	2	2.5	2.5	2.5	2.5	3	3	3
40	2	2	2.5	2.5	2.5	3	3	3	3	3
50	2.5	2.5	2.5	3	3	3	3	3	3	NR
60	2.5	3	3	3	3	3	3	NR	NR	NR
70	3	3	3	3	3	NR	NR	NR	NR	NR
80	3	3	3	NR						
90	3	3	NR							

Minimum Pipe Diameter 125,000 BTU/HR Models

Vent Pipe Length (ft.)	Number of 90° Elbows									
	0	1	2	3	4	5	6	7	8	9
5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
10	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3
20	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3	NR
30	2.5	2.5	2.5	2.5	2.5	3	3	NR	NR	NR
40	2.5	2.5	2.5	2.5	3	NR	NR	NR	NR	NR
50	2.5	3	3	NR						
60	3	3	NR							

NR = Not Recommended

* 2" not recommended at altitude above 4,000 ft.
3" required for altitude above 5,000 ft.

Figure 4

Concentric Vent Kit

A concentric vent kit (see Accessories section on page 34 for correct kit) is available for use when installing this furnace as a direct vent furnace and the air intake and vent pipe are to be run through the same hole, whether horizontally through the wall or vertically through the roof (see Figure 3). Refer to the instructions included with the concentric vent kit for installation specifics.

Vent Pipe Size and Length

The vent pipe and air intake pipe (in direct vent installations) should be sized in accordance with the information found in the appropriate table in Figure 4. One 90° elbow is equivalent to 5' of pipe. Two 45° elbows are equivalent to one 90° elbow. The minimum length certified for use with this furnace is 5' and one elbow, not including the vent and air intake terminals.

In the event that the pipe length is in between the lengths listed in the table, use the next larger length listed. For example, if a length of pipe needed to install the furnace is 27', use the diameter values for the 30' row in the tables. For direct vent installations, if the vent and air intake pipe are not equal in length and number of elbows, then determine the minimum pipe diameter for both the vent and air intake. If the results indicate different diameters, use the larger of the two for both the vent and air intake. **Under no circumstances should the vent and air intake pipe size be different in diameter.** For installation details, refer to the appropriate section in pages 11 – 15 for the unit model and type of installation.

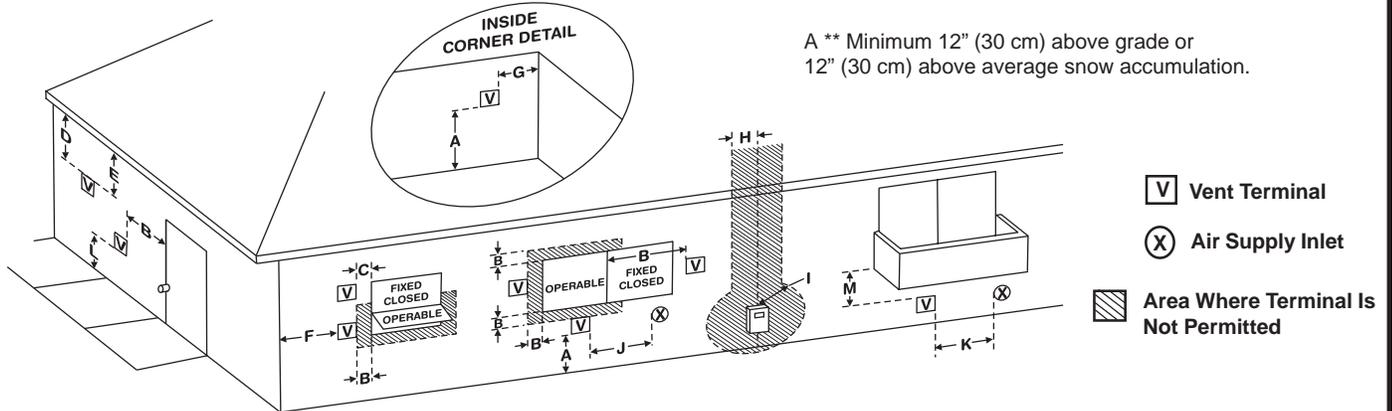
High Altitude Installation: 2" pipe not recommended at altitude above 4,000 feet. 3" pipe required for altitude above 5,000 feet.

Horizontal Venting

The vent for this appliance shall not terminate over public walkways; or near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage; or where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment. See Figures 5 and 6 on pages 9 and 10 for additional information on where the horizontal vent terminal can and cannot terminate.

For Massachusetts Installations: The installation must comply with Massachusetts 248 CMR 5.08 Modifications to sections of NFPA-54, Chapter 10. (See pages 39 and 40)

Sidewall Vent Terminal Clearances (Direct Vented Furnaces)



		Canadian Installations ¹	US Installations ²
A **	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30cm)	12 inches (30cm)
B	Clearance to window or door that may be opened	6 inches (15cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kW), and ≤ 100,000 Btuh (30 kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30 kW)	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 9 inches (23 cm) for appliances > 10,000 Btuh (3 kW), and ≤ 50,000 Btuh (15 kW), 12 inches (30 cm) for appliances > 50,000 Btuh (15 kW)
C	Clearance to permanently closed window	*	*
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	*	*
E	Clearance to unventilated soffit	*	*
F	Clearance to outside corner	*	*
G	Clearance to inside corner	*	*
H	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet (4.5 m) above the meter/regulator assembly	*
I	Clearance to service regulator vent outlet	3 feet (91 cm)	*
J	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kW), and ≤ 100,000 Btuh (30 kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30 kW)	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 9 inches (23 cm) for appliances > 10,000 Btuh (3 kW), and ≤ 50,000 Btuh (15 kW), 12 inches (30 cm) for appliances > 50,000 Btuh (15 kW)
K	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m) †	*
M	Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) ‡	*

¹ In accordance with the current *CSA B149.1, Natural Gas and Propane Installation Code*

² In accordance with the current *ANSI Z223.1/NFPA 54, National Fuel Gas Code*

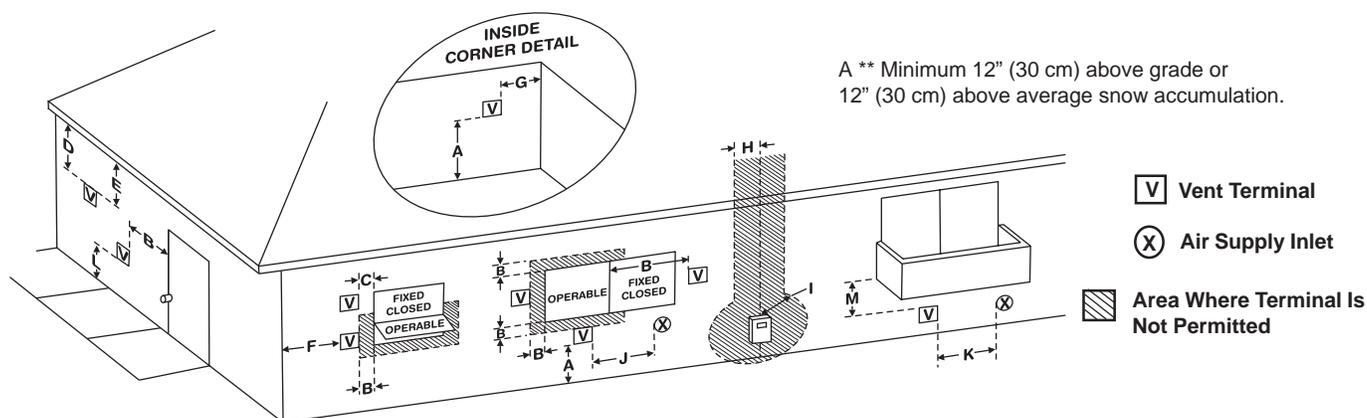
† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

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

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

Figure 5

Sidewall Vent Terminal Clearances (Non-Direct Vented Furnaces)



A ** Minimum 12" (30 cm) above grade or
12" (30 cm) above average snow accumulation.

- V Vent Terminal
- X Air Supply Inlet
- Area Where Terminal Is Not Permitted

		Canadian Installations ¹	US Installations ²
A **	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B	Clearance to window or door that may be opened	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kW), and ≤ 100,000 Btuh (30 kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30kW)	4 feet (1.2 m) below or to side of opening; 1 foot (30 cm) above opening
C	Clearance to permanently closed window	*	*
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	*	*
E	Clearance to unventilated soffit	*	*
F	Clearance to outside corner	*	*
G	Clearance to inside corner	*	*
H	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet (4.5 m) above the meter/regulator assembly	*
I	Clearance to service regulator vent outlet	3 feet (91 cm)	*
J	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kW), and ≤ 100,000 Btuh (30 kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30kW)	4 feet (1.2 m) below or to side of opening; 1 foot (30 cm) above opening
K	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m)†	7 feet (2.13 m)†
M	Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) ‡	*

¹ In accordance with the current *CSA B149.1, Natural Gas and Propane Installation Code*

² In accordance with the current *ANSI Z223.1/NFPA 54, National Fuel Gas 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.

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

Figure 6

For horizontal venting in situations where clearance to floor joists is limited, see **Horizontal Venting – Low Clearance Installations** on page 15.

Upflow Direct Vent Installation

An inlet air restrictor plate (see Figure 2 on page 6) is supplied with this furnace and can be found in the plastic bag containing these Installation Instructions and the User's Information Manual. **This restrictor plate is to be used only in non-direct vent applications.** See page 5 for more information on installing the restrictor plate in non-direct vent applications.

The flue pipe screen (see Figure 2 on page 6) should be installed at the termination of the flue pipe and is designed to keep objects out of the flue pipe. An additional screen should **not** be placed in the intake termination. If a screen is installed, the air intake may freeze shut.

For horizontal venting, refer to Figure 7. For vertical venting, refer to Figure 8. It is permissible to run the vent vertically

through the roof and terminate it as shown in Figure 8, and to run the combustion air intake pipe horizontally through a side wall and terminate as shown in Figure 7. The vent pipe on horizontal runs must slope upward, away from the furnace, at a minimum pitch of 1/4" per foot of run, to prevent accumulation of condensate.

Do not cement air intake into the connector on burner box. Use high temperature RTV silicone sealant so intake pipe can be removed if service is required.

In horizontal venting applications, the vent and air intake pipe must be installed on the same side of the house within the parameters shown in Figure 7.

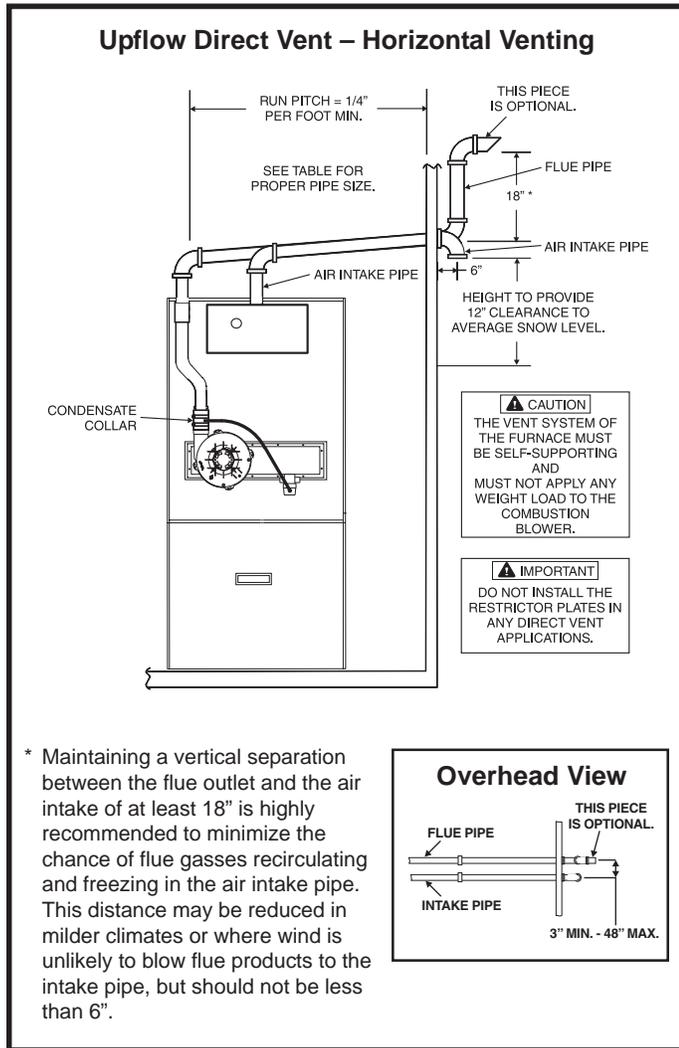


Figure 7

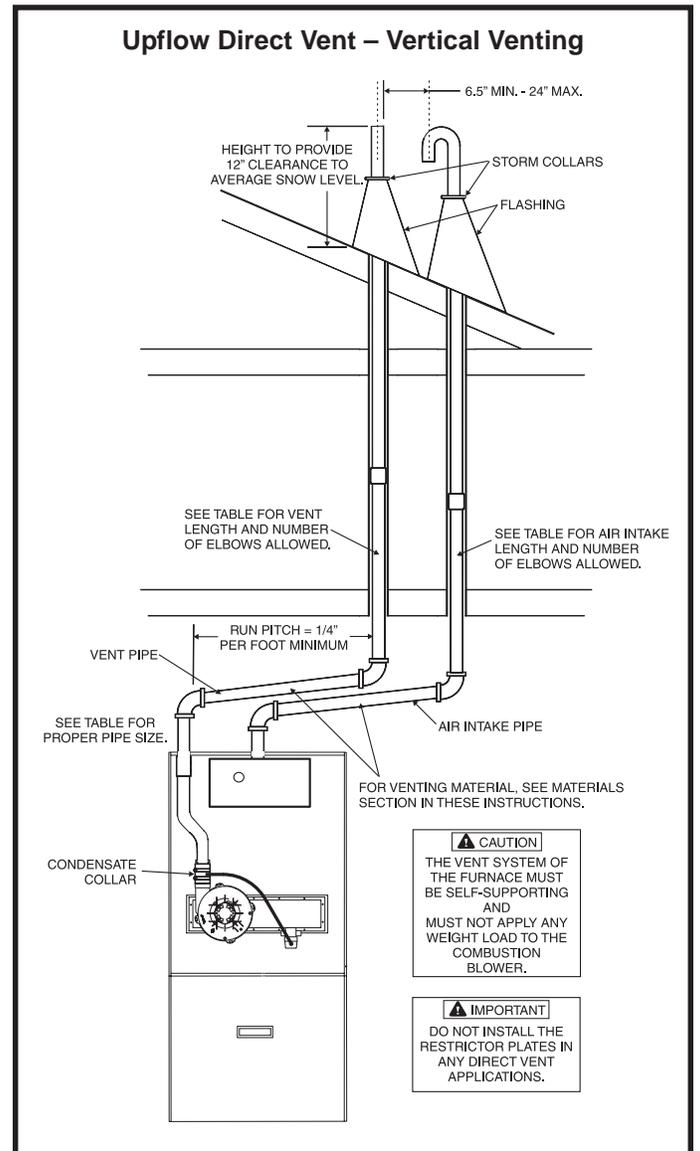


Figure 8

Prime the trap system by slowly pouring 1 cup of water down the vent pipe. On initial start-up of the unit, some of the water used to prime the trap system may run down into the combustion blower and cause noise.

Upflow Non-Direct Vent Installation

An inlet air restrictor plate (see Figure 2 on page 6) is supplied with this furnace and can be found in the plastic bag containing these Installation Instructions and the User's Information Manual. This restrictor plate is to be used only in non-direct vent applications. See page 5 for more information on installing the restrictor plate in non-direct vent applications.

Two inlet air restrictor plates are supplied with each furnace – a 2" plate and a 3" plate. Use the proper restrictor plate for the furnace model.

The flue pipe screen (see Figure 2 on page 6) should be installed at the termination of the flue pipe and is designed to keep objects out of the flue pipe.

For horizontal venting, refer to Figure 9. For vertical venting, refer to Figure 10. The vent pipe on horizontal runs must slope upward, away from the furnace, at a minimum pitch of 1/4" per foot of run, to prevent accumulation of condensate.

Prime the trap system by slowly pouring 1 cup of water down the vent pipe. On initial start-up of the unit, some of the water used to prime the trap system may run down into the combustion blower and cause noise.

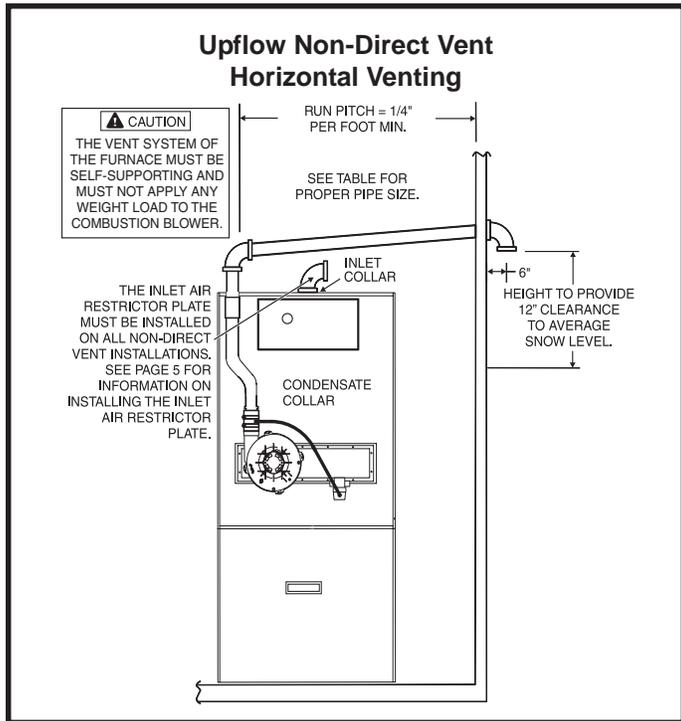


Figure 9

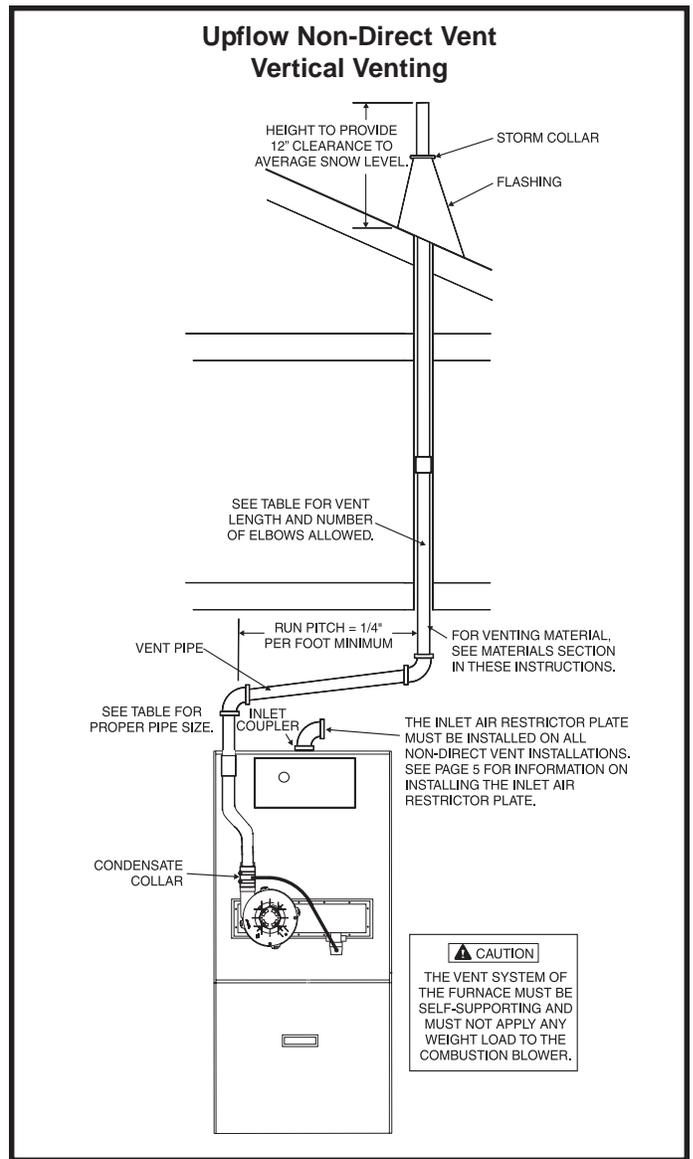


Figure 10

Horizontal Direct Vent Installation

An inlet air restrictor plate (see Figure 2 on page 6) is supplied with this furnace and can be found in the plastic bag containing these Installation Instructions and the User's Information Manual. **This restrictor plate is to be used only in non-direct vent applications.** See page 5 for more information on installing the restrictor plate in non-direct vent applications.

The flue pipe screen (see Figure 2 on page 6) should be installed at the termination of the flue pipe and is designed to keep objects out of the flue pipe. An additional screen should **not** be placed in the intake termination. If a screen is installed, the air intake may freeze shut.

Maintaining a vertical separation between the flue outlet and the air intake of at least 18" is highly recommended to minimize the chance of flue gasses re-circulating and freezing in the air intake pipe. The 18" separation is shown for horizontal

installations in Figure 11. This distance may be reduced in milder climates or where wind is unlikely to blow flue products to the intake pipe, but should not be less than 6".

For horizontal venting, refer to Figure 11. For vertical venting, refer to Figure 12. It is permissible to run the vent vertically through the roof and terminate it as shown in Figure 12, and to run the combustion air intake pipe horizontally through a side wall and terminate as shown in Figure 11. The vent pipe on horizontal runs must slope upward, away from the furnace, at a minimum pitch of 1/4" per foot of run, to prevent accumulation of condensate.

Do not cement air intake into the connector on burner box. Use high temperature RTV silicone sealant so intake pipe can be removed if service is required.

In horizontal venting applications, the vent and air intake pipe must be installed on the same side of the house within the parameters shown in Figure 11.

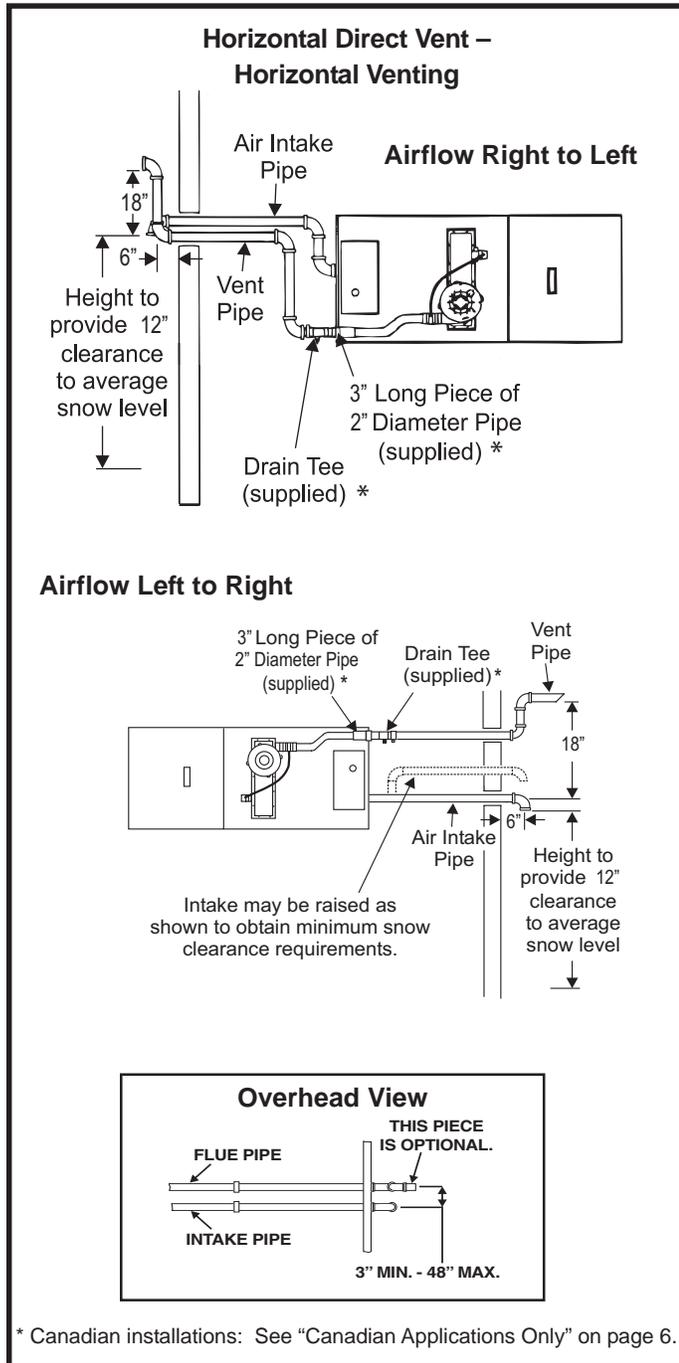


Figure 11

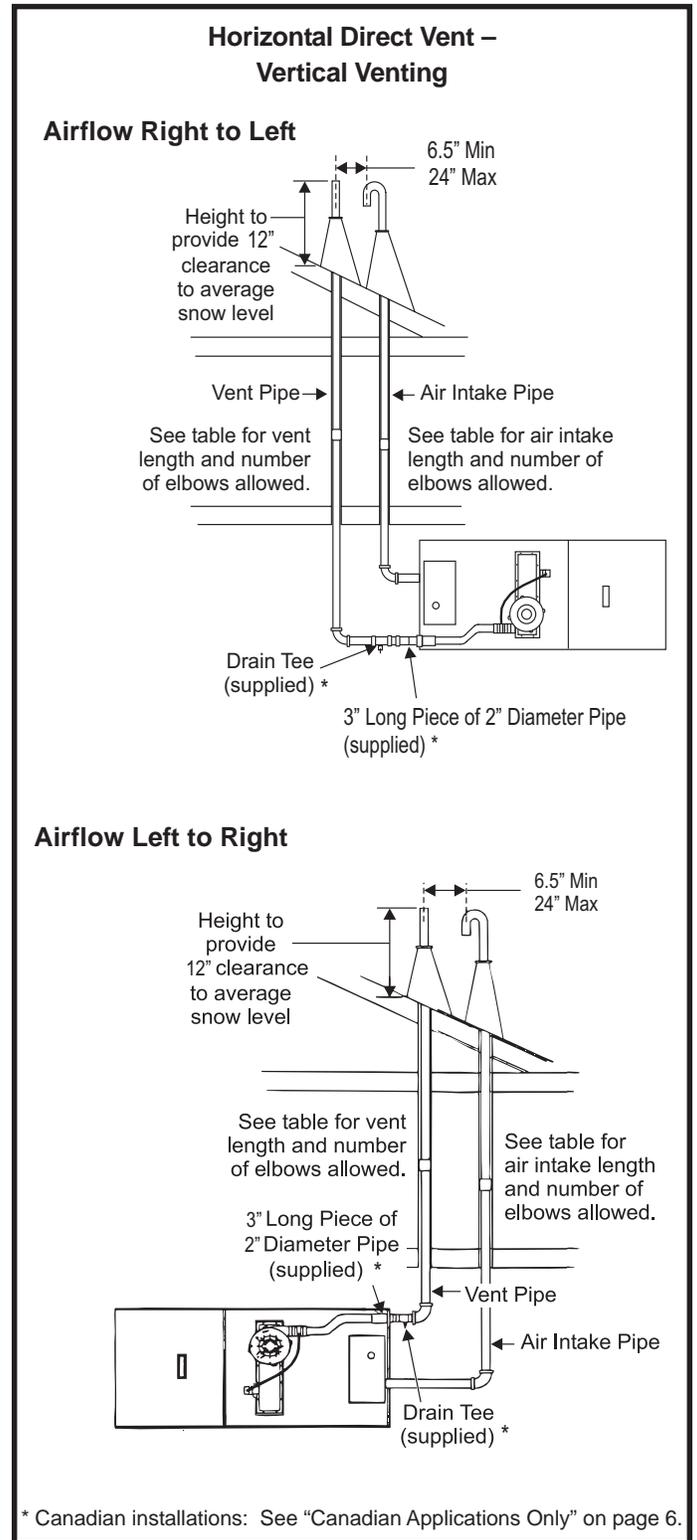


Figure 12

Prime the trap system by slowly pouring 1 cup of water down the vent pipe. On initial start-up of the unit, some of the water used to prime the trap system may run down into the combustion blower and cause noise.

Horizontal Non-Direct Vent Installation

An inlet air restrictor plate (see Figure 2 on page 6) is supplied with this furnace and can be found in the plastic bag containing these Installation Instructions. This restrictor plate is to be used only in non-direct vent applications. See page 5 for more information on installing the restrictor plate in non-direct vent applications.

Two inlet air restrictor plates are supplied with each furnace – a 2" plate and a 3" plate. Use the proper restrictor plate for the furnace model.

The flue pipe screen (see Figure 2 on page 6) should be installed at the termination of the flue pipe and is designed to keep objects out of the flue pipe.

For horizontal venting, refer to Figure 13. For vertical venting, refer to Figure 14. The vent pipe on horizontal runs must slope

upward, away from the furnace, at a minimum pitch of 1/4" per foot of run, to prevent accumulation of condensate.

Prime the trap system by slowly pouring 1 cup of water down the vent pipe. On initial start-up of the unit, some of the water used to prime the trap system may run down into the combustion blower and cause noise.

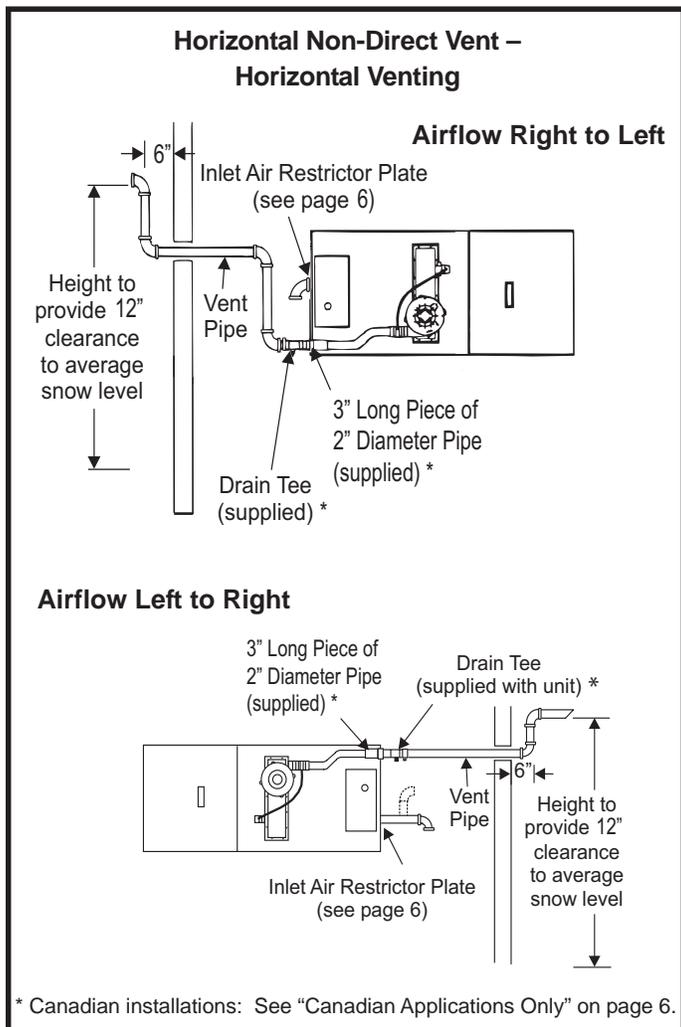


Figure 13

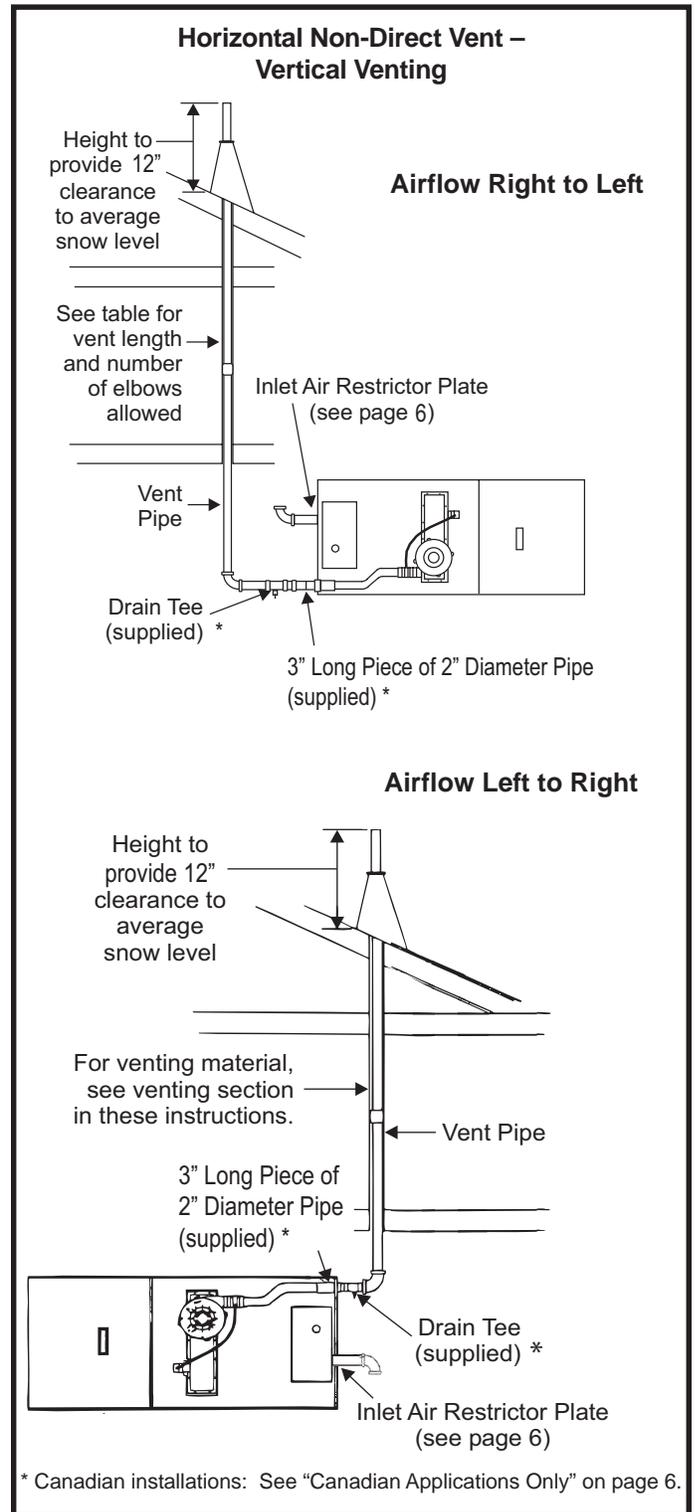


Figure 14

* Canadian installations: See "Canadian Applications Only" on page 6.

* Canadian installations: See "Canadian Applications Only" on page 6.

Horizontal Venting – Low Clearance Installations

Vent pipe on horizontal runs must slope upward, away from the furnace, at a minimum pitch of 1/4" per foot of run, to prevent accumulation of condensate. In certain horizontal, left-to-right airflow applications, the furnace's close proximity to the floor joists above the unit may make it difficult to obtain the required pitch/slope. Figures 15 and 16 show the accepted vent practice to obtain proper pitch/slope back to furnace for proper drainage. For direct vent applications, see Figure 15. For non-direct applications, see Figure 16.

In all applications, minimum clearances to combustibles must be observed (as shown in Table 1 on page 4) as well as all other required clearances shown in Figures 11 and 13 on pages 13 and 14.

Existing Venting Systems

When an existing furnace is removed or replaced, the original venting system may no longer be sized to properly vent the attached appliances. An improperly sized venting system can result in spillage of flue products into the living space, the

formation of condensate, leakage, etc. See the **WARNING** box below for proper test procedure.



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 common venting system are not in operation:

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, [ANSI Z223.1/NFPA 54 \(latest edition\)](#) or the [CSA B149.1, Natural Gas and Propane Installation Codes](#) and these instructions. Determine that there is no blockage or restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
3. As far as practical, close all building doors and windows between the space in which the appliance(s) connected to the venting system are located and other spaces in the building.
4. Close fireplace dampers.
5. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.
6. Follow the lighting instructions. Place the unit being inspected in operation. Adjust the thermostat so appliance is operating continuously.
7. Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
8. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the [National Fuel Gas Code, ANSI Z223.1/NFPA 54 \(latest edition\)](#) and/or the [CSA B149.1, Natural Gas and Propane Installation Codes](#).
9. After it has been determined that each appliance remaining connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other gas-fired burning appliance to their previous conditions of use.

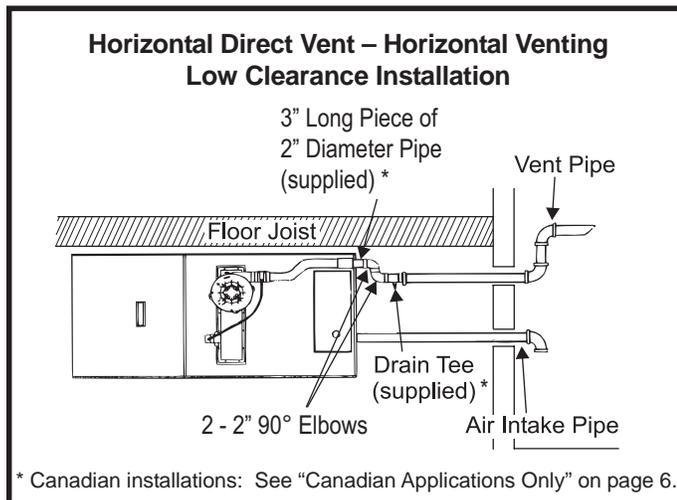


Figure 15

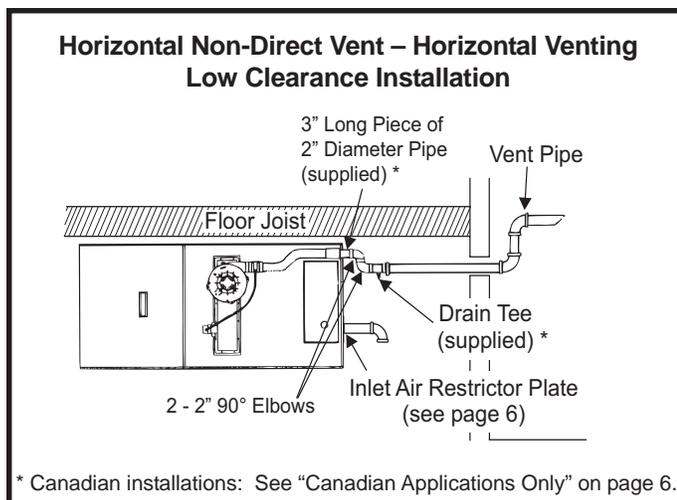


Figure 16

Condensate Disposal Installation

The condensate drain should be routed directly to a locally acceptable disposal area. The condensate drain line should not be run directly to the outdoors especially in colder climates where temperatures may cause the condensate to freeze in the drain line.

In horizontal installations where clearance beneath the unit is limited, an alternate method for condensate disposal trap installation may be used (see **Horizontal Installation – Tight Clearance Below Unit** on page 18).

Upflow Installation

Install the condensate drain line to the unit as follows. The condensate can be drained from either the right or left side of the furnace. Install the 1/2" NPT x 3/4" PVC adapter (supplied) in the drain on the side that the draining will occur. Install the plastic pipe plug opposite of the drain. Using 3/4" PVC pipe, make a connection from the adapter just installed to extend just outside the unit. Install a 3/4" PVC tee as shown in Figure 17. From the tee, install the drain to the disposal area. The top of the tee must be left open for proper condensate drainage.

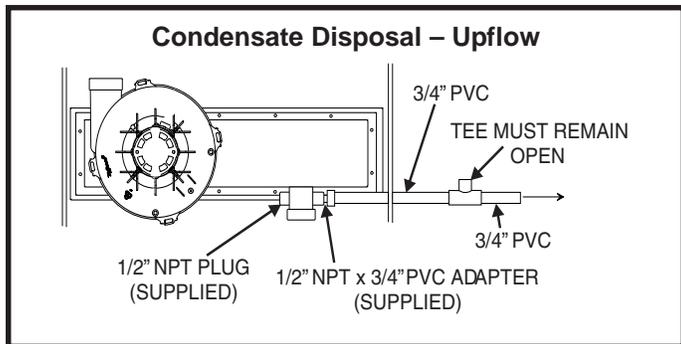


Figure 17

Horizontal Installation – Right to Left Airflow

Furnace must be mounted such that the side through which the condensate will drain is elevated a minimum of 9" above a surface such as a floor.

Install unit at a slight pitch forward (see Figure 18).

1. Relocate the 1/2" NPT plug installed on the flue pan to one side of the internal trap assembly (as shown in Figure 19).
2. Connect the 1/2" NPT plug (supplied) to the opposite side of the internal trap assembly from the plug installed in Step 1.
3. Insert trap assembly (supplied) into flue pan (see Figure 20).

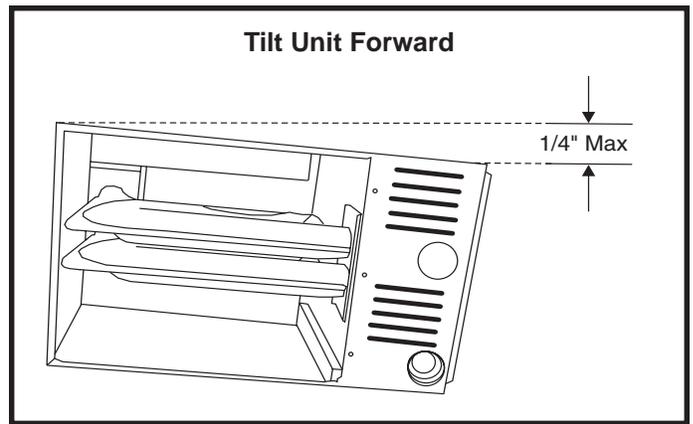


Figure 18

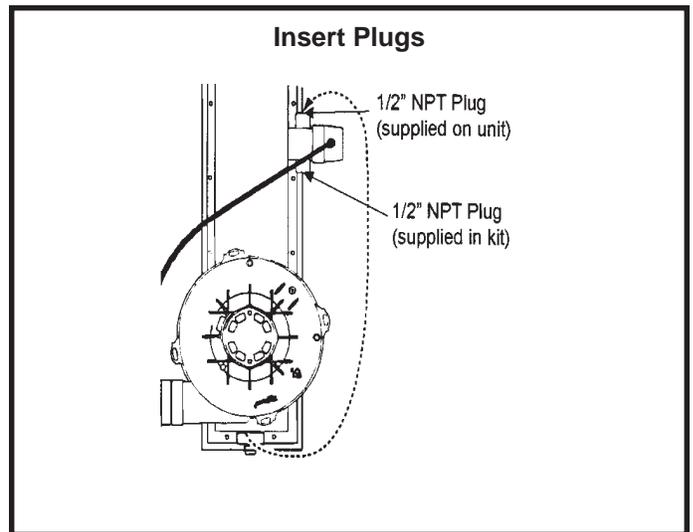


Figure 19

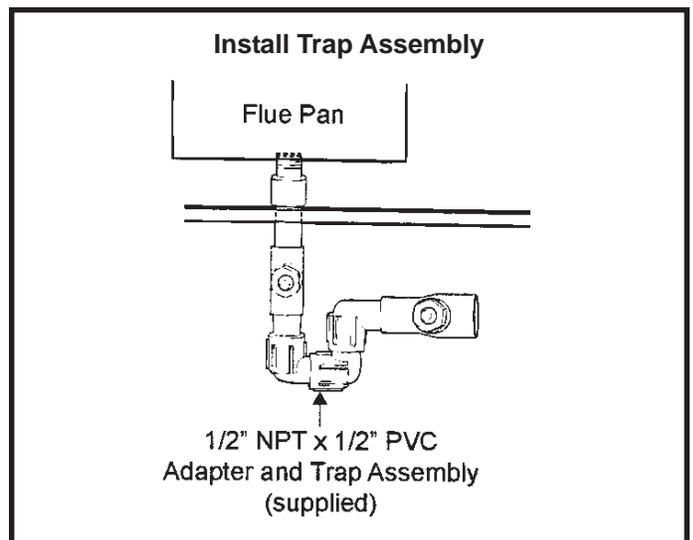


Figure 20

4. Connect a length of 3/4" PVC pipe (3' minimum) to the trap assembly (see Figure 21).
5. Install 3/4" tee (supplied) as shown in Figure 21.

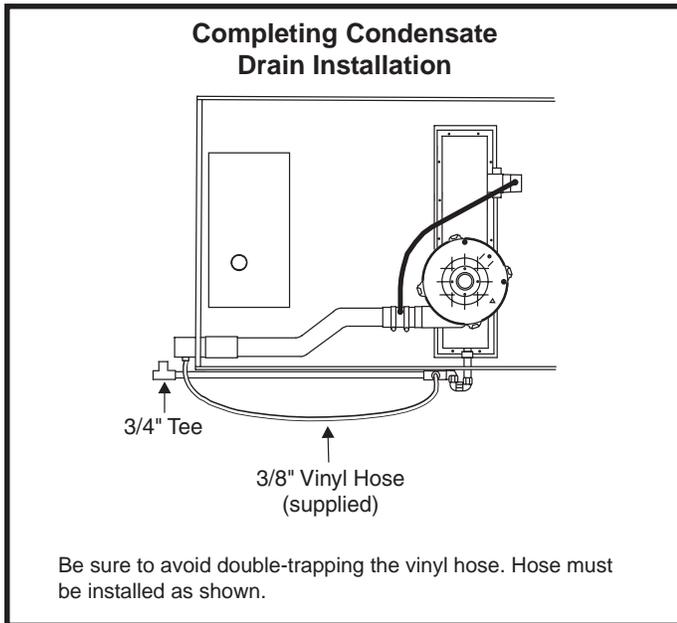


Figure 21

6. From the tee, connect the drain to disposal area. The top of the tee must be left open for proper condensate drainage. The open end of the tee must be oriented so that condensate does not run out of the opening.
7. Remove 72" vinyl hose supplied with unit and cut in half. Connect one end of the vinyl hose to the 3/8" barbed fitting of the 2" x 2" x 1/2" tee in vent and the other end to the 3/8" barbed fitting on the drain trap assembly.

Horizontal Installation – Left to Right Airflow

Furnace must be mounted such that the side through which the condensate will drain is elevated a minimum of 9" above a surface such as a floor.

Install unit at a slight pitch forward (see Figure 22).

1. Relocate 1/2" NPT plug installed on flue pan to one side of the internal trap assembly (as shown in Figure 23).
2. Connect the 1/2" NPT plug (supplied) to the opposite side of the internal trap assembly from the plug installed in Step 1.
3. Insert trap assembly (supplied) into flue pan (see Figure 24).

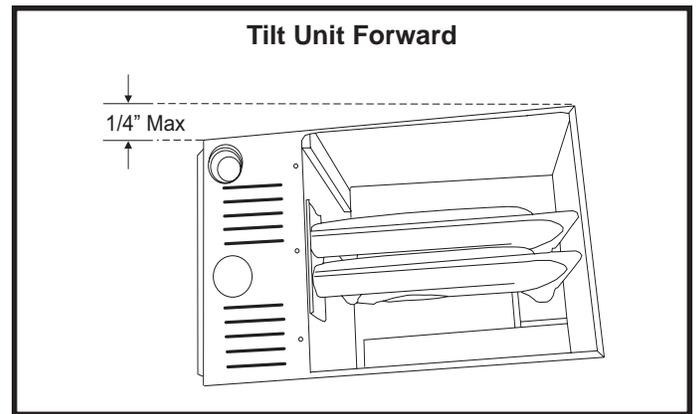


Figure 22

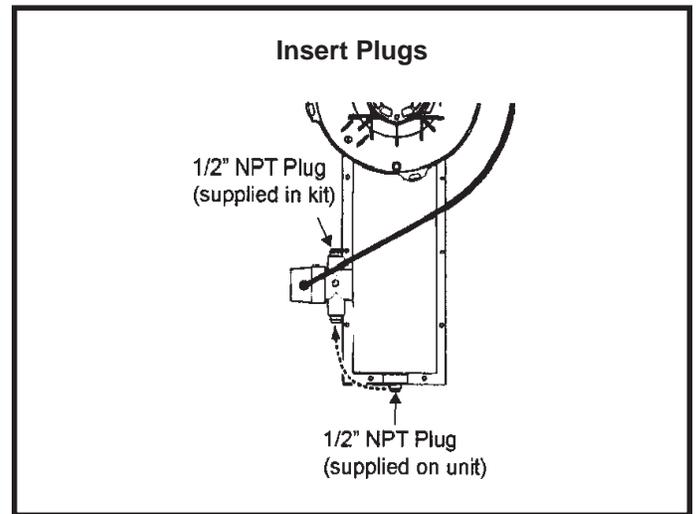


Figure 23

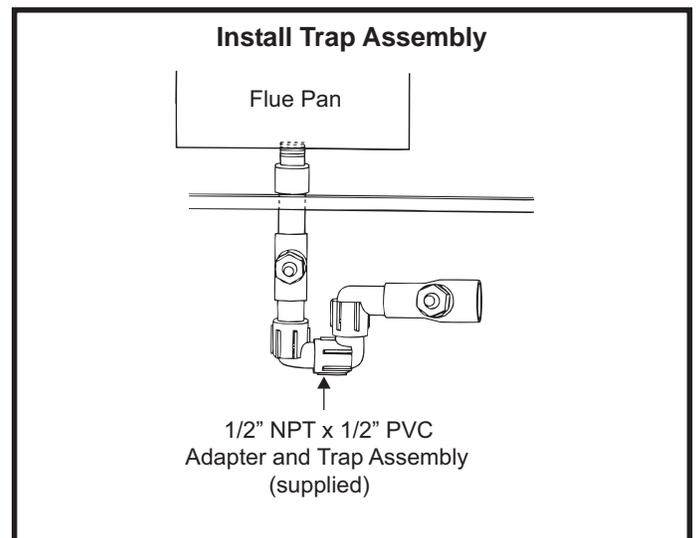
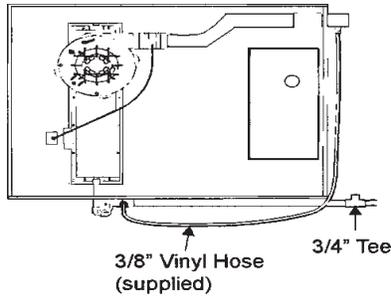


Figure 24

4. Connect a length of 3/4" PVC pipe (3' minimum) to the trap assembly (see Figure 25 on page 18).

Completing Condensate Drain Installation



Be sure to avoid double-trapping the vinyl hose. Hose must be installed as shown.

Figure 25

5. Install 3/4" tee (supplied) as shown in Figure 25.
6. From the tee, connect the drain to disposal area. The top of the tee must be left open for proper condensate drainage. The open end of the tee must be oriented so that condensate does not run out of the opening.
7. Connect one end of 72" vinyl hose (supplied) to 3/8" barbed fitting of the 2" x 2" x 1/2" tee in vent and the other end to 3/8" barbed fitting on drain trap assembly.

Horizontal Installation – Tight Clearance Below Unit

In certain horizontal installations, clearance between unit and drain pan beneath unit may be limited. In these applications, an alternate method may be used to install the condensate

drain trap assembly. Using two 90° elbows (field supplied), bring condensate trap out to side of unit beyond drain pan (see Figure 26). After trap assembly has been attached using this method, follow proper instructions on the previous pages for completing condensate drain installation.

CAUTION

To avoid property damage caused by condensate drain blockage, install a field-fabricated auxiliary drain pan with a separate drain line to the outside under the entire furnace and drain system, including open vent tees.

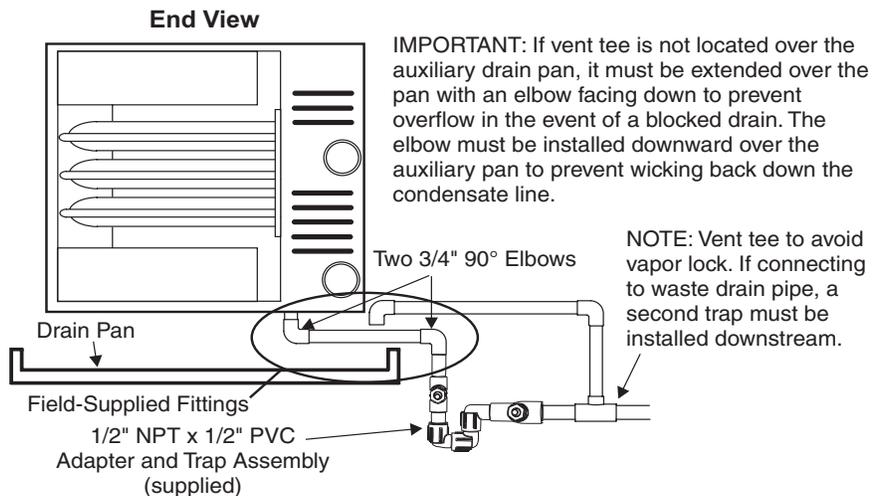
Drain Pressure Switch Connection

(for G2D93CT and G2D95CT multi-position units only. The G2D93CU and G2D95CU dedicated upflow units do not require a drain switch).

Upflow Installation

The G2D93CT and G2D95CT units are shipped from the manufacturer with a black hose having one end connected to the 0.10" drain pressure switch and the other end shipped loose. FOR UPFLOW INSTALLATIONS the loose end is to be connected to the capped tee in the hose assembly leading from the primary pressure switch to the inducer. Remove and discard the plastic cap from the tee and connect the hose from the 0.10" drain pressure switch to the tee. (See Figure 31.)

Condensate Drain Trap Installation – Tight Clearance Below Unit



Do not install trap assembly any farther than 10" from unit. The pressure switch and vent hoses must be able to reach the barbed fittings on the trap assembly.

Figure 26

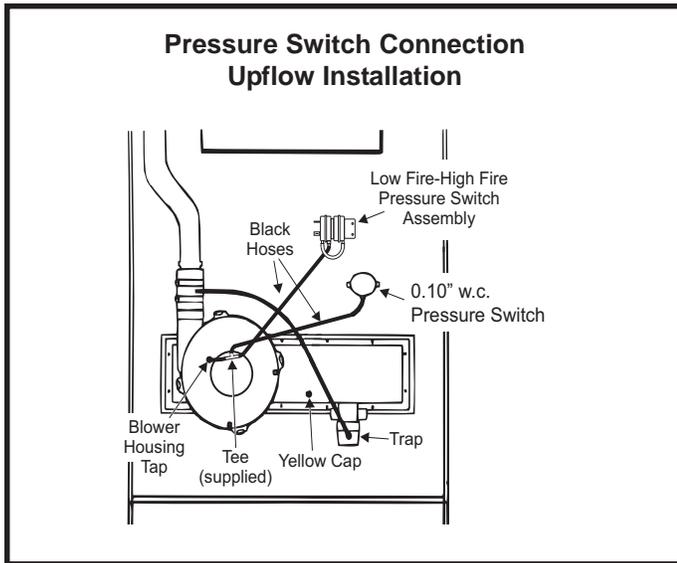


Figure 27

Be sure that the pressure switch hose does not form a trap to hold condensation that could form from the flue gas. Hose may be cut shorter to avoid forming a trap, if required.

Horizontal Installation

The G2D93CT and G2D95CT units are shipped from the manufacturer with a black hose having one end connected to the 0.10 inch drain pressure switch and the other end shipped loose. FOR HORIZONTAL INSTALLATIONS the loose end MUST be connected to the external drain trap.

Route hose through gas line access hole in cabinet. Then connect to 1/4 inch barbed fitting on drain trap assembly.

For right to left airflow installations, see Figure 28. For left to right airflow installations, see Figure 29.

Be sure that the pressure switch hose does not form a trap to hold condensation that could form from the flue gas. Hose may be cut shorter to avoid forming a trap, if required.

Circulating Air Supply

When the furnace is installed so that the supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall be handled by a duct or ducts sealed to the furnace casing and terminated outside the space containing the furnace.

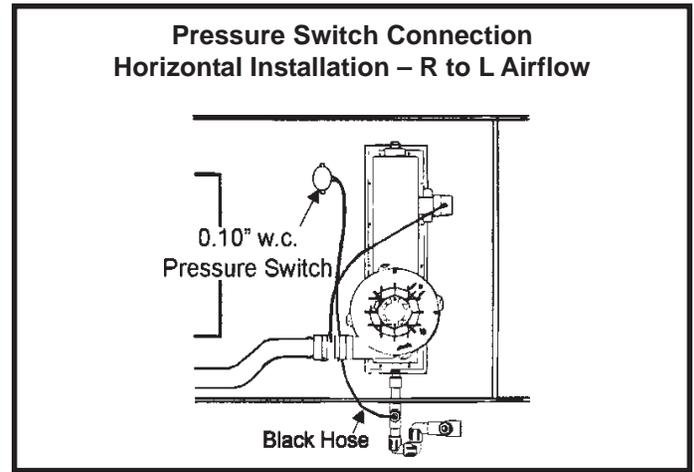


Figure 28

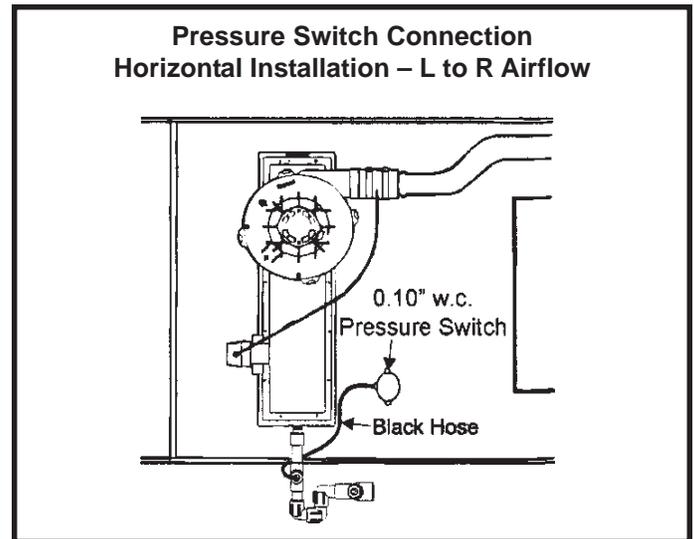


Figure 29

A return air duct system is recommended. If the unit is installed in a confined space or closet, a return connection must be run, full size, to a location outside the closet. The air duct in the closet must be tight to prevent any entrance of air from the closet into the circulating air.

If there is no complete return air duct system, the return air connection must be sealed to the furnace casing and run, full size, to a location outside the utility room or space housing the furnace to prevent a negative pressure on the venting system.

CAUTION

When an air conditioning unit is used in conjunction with the furnace, the evaporator coil must be installed in the discharge (supply) air. Do not install an evaporator coil in the return air; excessive condensation will occur within the furnace.

Outlet Duct

For installations not equipped with a cooling coil, a removable access panel must be provided in the outlet duct. The opening should be accessible when the furnace is placed in service. Smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heat exchanger. The cover for the opening shall be attached in such a manner as to prevent leaks. The recommended opening size is 6" x 14" for all sizes.

Filters

If a filter other than one supplied by the furnace manufacturer is used, it must be sized according to information provided in Table 3.

Minimum Filter Requirements						
Airflow Descriptor	Disposable Filters			Cleanable Filters		
	Min. Area (sq. in.)	Size (in.)	Qty.	Min. Area (sq. in.)	Size (in.)	Qty.
09	480	20 x 25	1	240	16 x 20	1
10	480	20 x 25	1	240	16 x 20	1
12	576	16 x 20	2	288	16 x 20	1
14	672	20 x 20	2	336	20 x 20	1
16	768	20 x 20	2	384	20 x 20	1
20	960	20 x 25	2	480	20 x 25	1

- The Airflow Descriptor is the two digits following the "D" (example: G2D93CT080D16C) or "V" (example: G2D95CT080V16C) in the model number.
- Areas and dimensions shown for cleanable filters are based on filters rated at 600 feet per minute face velocity.
- Typical filter sizes are shown; however, any combination of filters whose area equals or exceeds the minimum area shown is satisfactory.

Table 3

A filter rack and cleanable 16" x 25" x 1/2" filter are supplied with the furnace. (Models designed for more than 1600 CFM nominal air delivery include two of each.) The filter rack is to be installed between the return air duct and the side of the furnace.

Refer to Figure 30 and the following instructions to install the filter rack:

- Using the corner embossments as a guide, mark and cut a full-size opening in the side panel(s).
- Using the filter rack as a template, mark and drill four 7/64" diameter screw holes in the side panel(s).

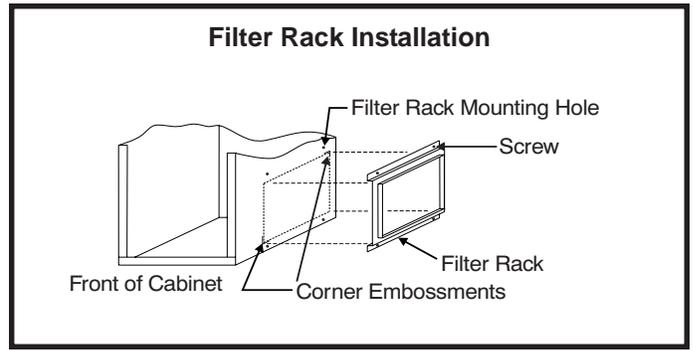


Figure 30

- With the filter access opening toward the front of the furnace, use sheet metal screws to fasten the rack(s) to the side panel(s).

The filter slides in the rack from the front of the unit. Install the filter(s) with the mesh side towards furnace.

Model #AFILTHA7 single side filter frame kit is available for single side return air connection in installations requiring more than 1600 CFM nominal air delivery. A bottom return filter kit (model #AFILT529) is also available from the manufacturer.

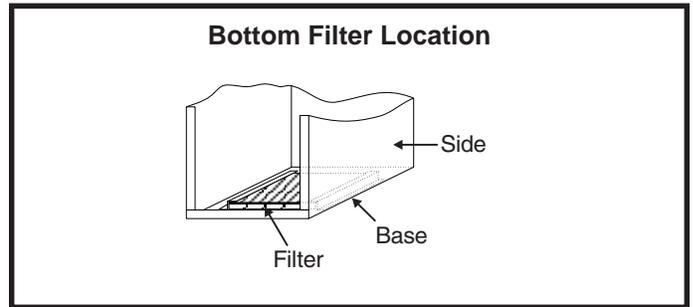


Figure 31

Other filter accessories are also available from the manufacturer including a full line of indoor air quality products. For information on these products, contact the local distributor.

Gas Supply and Piping

Refer to the furnace rating plate to make sure the furnace is equipped to burn the gas supplied (natural or propane).

Gas supply piping should be installed in accordance with local codes and the regulations of the utility. Piping must be of adequate size to prevent undue pressure drop. Consult the local utility or gas supplier for complete details on special requirements for sizing gas piping.

⚠ WARNING

Any conversion of a natural gas unit to propane gas must be done by qualified personnel using a conversion kit available from the manufacturer, following the instructions in the conversion kit. If done improperly, overfiring of the burners and improper burner operation can result. This can create carbon monoxide which could cause asphyxiation.

If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance.

Pipe connections must be tight, and a non-hardening pipe compound resistant to liquefied petroleum gases should be used.

Connect the gas pipe to the furnace controls providing a ground joint union as close to the controls as is possible to facilitate removal of controls and manifold. Provide a drip leg on the outside of the furnace. A manual shutoff valve shall be installed in the gas line, outside the unit, 5' above the floor, or in accordance with any local codes. A test gauge connection must be installed with a 1/8" NPT plugged tapping immediately upstream of the shutoff valve (see Figure 32).

The furnace must be isolated from the gas supply piping system by closing the individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressure equal to or less than 1/2 psig (3.5 kPa) or 14" W.C. If the piping system is to be tested at pressures in excess of 1/2 psig (3.5 kPa), the furnace and its appliance

⚠ WARNING

The gas valve supplied with this furnace is rated at 1/2 psig maximum. Any higher pressure may rupture the pressure regulator diaphragm and may cause overfiring of the burners and improper burner operation. The overfiring may result in the creation of carbon monoxide which could cause asphyxiation.

main gas valve must be disconnected from the gas supply piping system.

After gas piping is complete, carefully check all piping connections (factory and field) for gas leaks. Use a leak detecting solution or other preferred means. Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak detection has been completed.

Gas Piping Connection

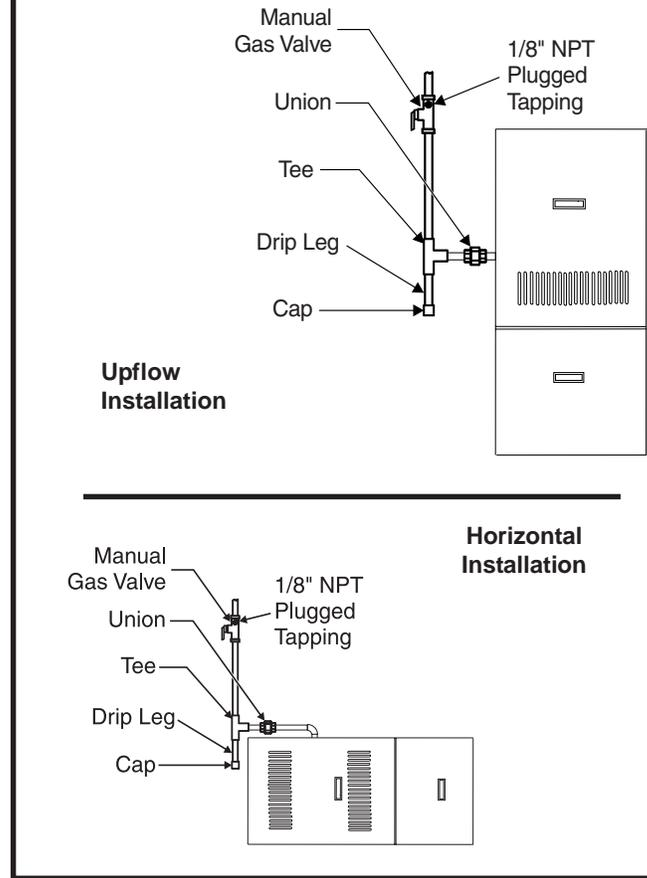


Figure 32

⚠ WARNING

FIRE OR EXPLOSION HAZARD

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

Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.

⚠ WARNING

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

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

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

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

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

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

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

Thermostat

Install a room thermostat according to the instructions furnished with it. Select a location on an inside wall that is not subject to drafts, direct sunshine, or other heat sources. The initial heat anticipator setting should be equal to the total current draw of the control circuit.

Low voltage thermostat connections are to be made to the integrated ignition/blower control board as indicated on the wiring diagram.

Single Stage Thermostat Operation

The automatic heat staging option allows a single stage thermostat to be used with a two stage furnace. To activate this option, move the jumper pin (see Figure 33) to desired setting (5 minutes or 10 minutes). The furnace will start on 1st

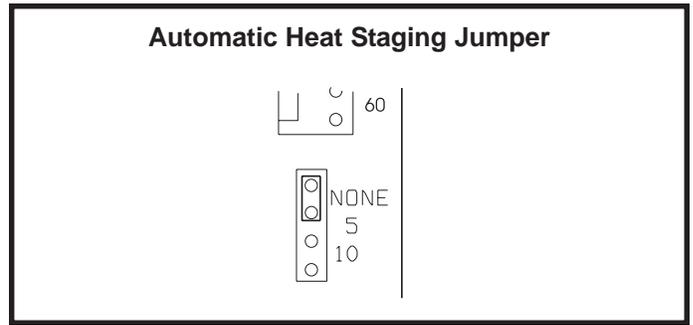


Figure 33

stage heat and stay at 1st stage heat for the duration of the selected time before switching to 2nd stage heat.

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

Humidifier

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

Electronic Air Cleaner

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

Continuous Blower Operation (G2D93CT/U Models)

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

If continuous blower operation on low speed is desired, connect the lowest speed motor tap to the “CONT” terminal on the integrated ignition/blower control board (refer to the furnace wiring diagram). The blower will operate on low speed whenever main power is connected to the furnace, except when it operates on heating or cooling speed during thermostat call for heat or cooling. **This constant air terminal is intended for low speed only.** If a motor is wired for a higher speed, the increased amp draw could cause the board control to fail and void the warranty.

Continuous Blower Operation (G2D95CT/U Models)

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

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

Twinning (G2D93CT/U Models Only)

The integrated ignition/blower control board is designed to permit “twinning” of furnaces (two furnaces connected to a common supply and return air system, and controlled by one thermostat).

When “twinning” two furnaces, each furnace must have its own dedicated vent system.

To twin two G2D93CT/U furnaces, connect wires as shown in either Figure 34 below or Figure 35 on page 24. **G2D95CT/U furnaces cannot be twinned.**

NOTE: If a single stage thermostat is used, move the automatic heat staging jumper pin (see Figure 33) from the NONE position to either the 5 or 10 minute setting. Connect rest of wiring as shown in Figure 34 or Figure 35 except in this single stage thermostat configuration, the W2 must remain open (only W1 should be connected).

If the red LED on the control board flashes a “9 flash” fault code after the units are energized (see Table 5 on page 33), switch 24V leads on the transformer in one of the units to bring both transformers into phase.

Variable Speed Features (G2D95CT/U Models Only)

The G2D95CT/U furnace is equipped with a variable speed circulation air blower motor that will deliver a constant airflow within a wide range of external static pressures.

Other features of this variable speed motor include:

Soft Start

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

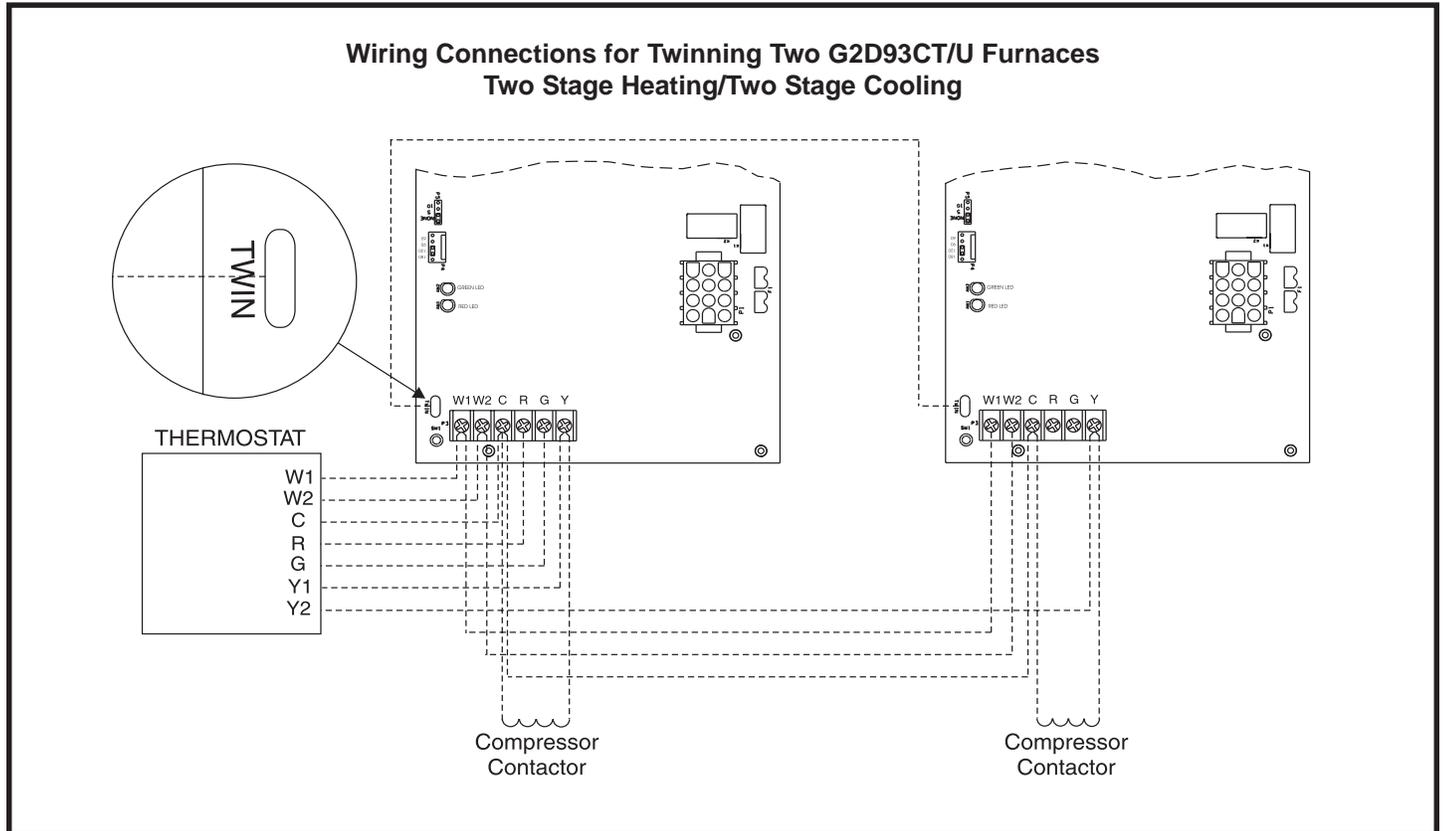


Figure 34

Wiring Connections for Twinning Two G2D93CT/U Furnaces Two Stage Heating/Single Stage Cooling

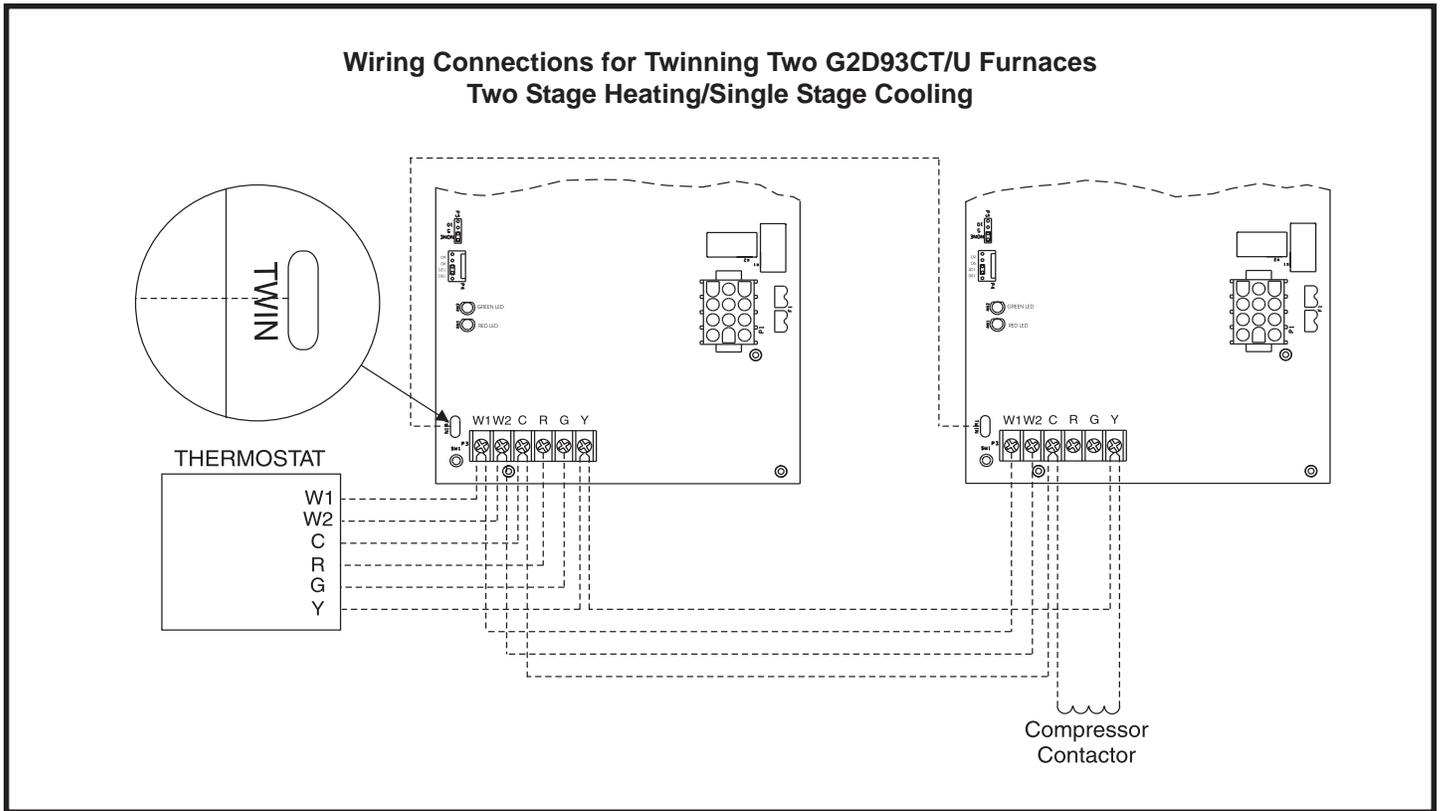


Figure 35

Soft Stop

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

Passive and Active Dehumidification

Passive Dehumidification

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

Active Dehumidification

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

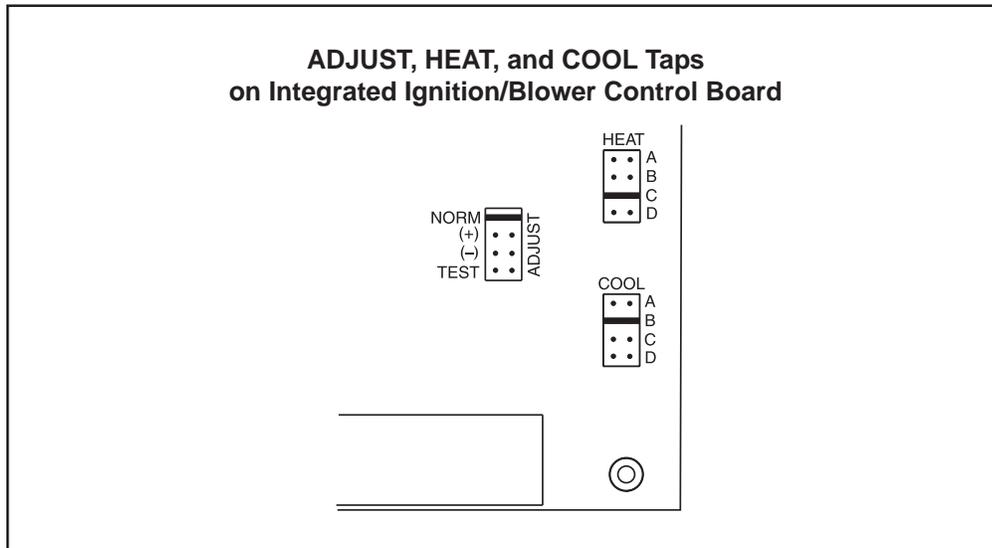
Both the passive and active dehumidification methods described above can be utilized on the same furnace.

Circulating Airflow Adjustments

Cooling Mode

The units are factory set for the highest airflow for each model. Adjustments can be made to the cooling airflow by repositioning the jumper plug marked COOL – A, B, C, D (see Figure 36) based on the information found in the table. To determine what CFM the motor is delivering at any time, count the number of times the amber LED on the control board flashes. Each flash signifies 100 CFM; count the flashes and multiply by 100 to determine the actual CFM delivered (for example: 10 flashes x 100 = 1000 CFM).

Adjusting Airflow – G2D95CT/U Models Only



Model	Motor HP	ADJUST Setting	Heating CFM @ .50 Static			Cooling CFM @ .50 Static			
			HEAT Setting	High Fire	Low Fire	COOL Setting A	COOL Setting B	COOL Setting C	COOL Setting D
G2D95CT/U040V12	1/2	NORM	A	750	500	1200	1000	800	600
G2D95CT/U060V14	1/2	NORM	A	1000	650	1400	1200	1000	800
G2D95CT/U080V16	3/4	NORM	A	1500	950	1600	1400	1200	1000
G2D95CT/U080V20	1	NORM	C, D	1500	950	2000	1800	1600	1400
G2D95CT/U100V20	1	NORM	B	1700	1150	2000	1800	1600	1400
G2D95CT/U125V20	1	NORM	A	2100	1450	2000	1800	1600	1400

Figure 36

Heating Mode

The unit as shipped is factory set to run at the middle of the heating rise range as shown on the unit rating plate. If higher or lower rise is desired, change the airflow 15% up or down by moving the ADJUST jumper plug (see Figure 36) from the NORM position to the (+) or (-) position. This adjustment will also cause the cooling airflow to be raised or lowered by 15%.

The TEST position on the ADJUST tap is not used.

The jumper plug on the HEAT tap should remain in the position (A, B, C, or D) listed in the HEAT Setting column in the table found in Figure 36. Changing the setpoints may not increase or decrease heating blower speeds. In some cases, running the blower with the heat settings in the wrong position may cause the furnace to operate outside the furnace's intended temperature rise range.

START-UP

Lighting Instructions

For Your Safety, Read Before Operating

WARNING

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

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

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

What to do if you smell gas:

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

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

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

To Start Furnace:

CAUTION

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

1. Set the room thermostat to lowest setting.
2. Remove burner access door.

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

To Shut Down Furnace:

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

WARNING

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

OPERATION

Sequence of Operation (G2D93CT/U Models)

Heating

When the control is in standby mode, it continually monitors thermostat input, rollout switch, and flame sense.

On a call for 1st stage heat, W1 and R are connected. The control verifies the limit switch is closed and both low and high pressure switches are open. The control always starts on low-fire and ignores 2nd stage call for 30 seconds.

The induced draft blower is energized on high speed and waits for the low pressure switch to close. The inducer remains on high speed and begins a pre-purge period when the low pressure switch closes. After a 15-second pre-purge, the control energizes the hot surface igniter for a period of 7 seconds (15 seconds on retries) before the gas valve is energized on 1st stage and burners ignite. After a 30-second blower "on" delay, the control energizes the low heat circulating air blower. Fifteen seconds after the circulating air blower energizes, the combustion air blower switches to low speed and runs at that speed until the thermostat is satisfied.

If the 1st stage is not sufficient to satisfy the heating demand, the room thermostat initiates call for the 2nd stage heat (W1 and W2). The control energizes the combustion blower on high speed and confirms the high-fire pressure switch contacts are closed. If the contacts are closed, the gas valve energizes on the 2nd stage and the high-heat circulating air blower is energized.

If the automatic heat staging option is being used (see **Single Stage Thermostat Operation** on page 22), the furnace does not switch to 2nd stage heat in response to a call from the thermostat but instead operates at 1st stage heat for the duration of the selected time before automatically switching to 2nd stage heat.

When the 2nd stage heat is satisfied, the control shuts off the gas valve and runs the combustion blower for a post-purge period of 15 seconds. The circulating air blower continues to run according until the selected blower "off" delay time (factory shipped at 120 seconds) ends.

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

If during a heating cycle the limit control senses an abnormally high temperature and opens, the circulating air blower is energized on high speed and continues to run while the limit is still open.

Fan On

A call for fan from the thermostat closes R to G on the control board. The control waits for a 1-second thermostat debounce delay before responding by energizing the low heat speed blower. When the call for fan is turned off, the control de-energizes the blower.

Cooling

During a call for cooling, the thermostat energizes the R-Y circuit of the control board. After a 1-second cooling "on" delay, the control energizes the cooling fan speed. If the fan is already energized, it remains running and does not de-energize for the 1-second cooling fan "on" delay.

The call for cooling has priority over continuous fan operation while a call for heating has priority over both a call for cooling or continuous fan. Ignition lockouts for any reason do not affect cooling operation.

As cooling demand is met, the thermostat de-energizes the R-Y circuit of the control board. After a 60-second cooling "off" delay, the control de-energizes the cooling speed fan. At the end of the cooling "off" delay period, the control returns to the standby mode.

Sequence of Operation (G2D95CT/U Models)

Heating (see Figures 37 and 38 on page 28)

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

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

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

If the automatic heat staging option is being used (see **Single Stage Thermostat Operation** on page 22), the furnace does not switch to 2nd stage heat in response to a call from the thermostat but instead operates at 1st stage heat for the duration of the selected time before automatically switching to 2nd stage heat.

**1st Stage – 2nd Stage (W1/W2) Heat Call
(G2D95CT/U Models)**

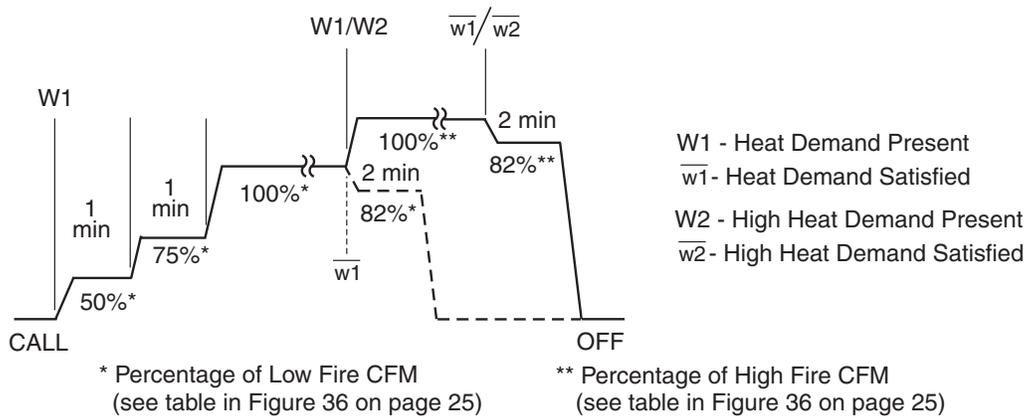


Figure 37

**High Heat (W2) Call
(G2D95CT/U Models)**

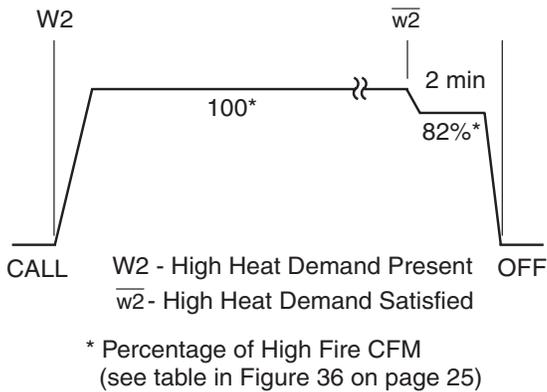


Figure 38

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

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

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

Fan On (see Figure 39)

When the thermostat is set for continuous fan operation and there is no demand for heating or cooling, a call for fan closes the R to G circuit and the circulating blower motor

**Call for Fan
(G2D95CT/U Models)**

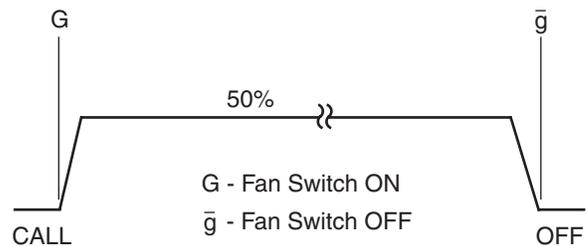


Figure 39

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

Cooling

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

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

▲ IMPORTANT

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

Single Stage Cooling (see Figure 40)

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

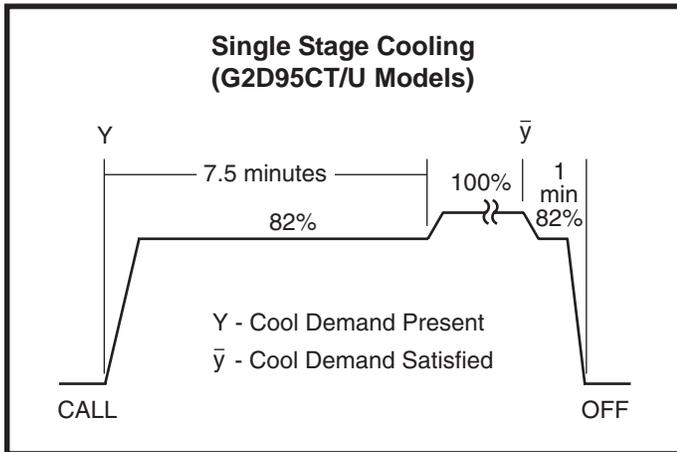


Figure 40

Two Stage Cooling (see Figure 41)

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

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

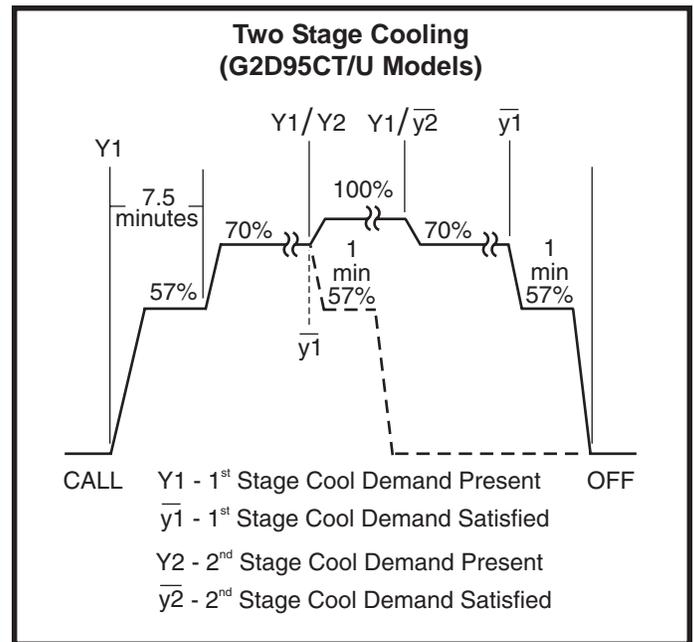


Figure 41

Heat Pump

For heat pump operation, clip the jumper wire located below the O terminal on the integrated ignition/blower control board. In heat pump mode, a call for heat pump operation follows the same sequence as a call for cooling with the exception that there is a 30-second blower ramp up to blower CFM.

Controls

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

Pressure Switch

The pressure switch is a normally open switch that monitors combustion air flow. Inadequate air flow resulting from excessive venting system restriction, a failed combustion blower, or a blocked drain will cause the switch to remain open.

Rollout Switch

The rollout switch is a normally closed switch that opens when abnormal temperatures exist in the burner area. This can be caused by a restricted heat exchanger causing the burner flame to “roll out” into the vestibule area or burner box. These units have two rollout switches. This switch must be manually reset by pushing the button on top to restore furnace operation.

Primary Limit Control

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

Auxiliary Limit Control

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

G2D93CU and G2D95CU models do not include an auxiliary limit control.

Interlock (Blower Door) Switch

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

System Sentry™ Integrated Ignition/Blower Control Board

The System Sentry™ integrated ignition/blower control board operates all functions of the furnace and the accessories connected to it.

G2D93CT/U models feature user-selectable blower "off" delay times (60, 90, 120, and 180 seconds) that are factory set to provide a 120-second blower "off" delay on heating (see wiring diagram on page 35).

Refer to the furnace wiring diagram while using the following procedure to the change motor speed on a G2D93CT/U furnace:

1. Turn off electrical power to the unit.
2. Connect the desired speed tap for cooling on the integrated ignition/blower control board.
3. For heating speed, check the temperature rise and, if necessary, adjust the blower speed tap to maintain temperature rise within the range shown on the furnace rating plate.

To use the same speed tap for both heating and cooling, install a piggyback terminal on the speed tap using a short jumper. Wire 1/4" quick connect terminals on both ends to jumper the "HEAT" and "COOL" speed on the integrated ignition/blower control board.

4. The remaining speed taps must be connected to dummy terminals marked "PARK" on the integrated ignition/blower control board.

Checking and Adjusting Gas Input

The minimum permissible gas supply pressure for the purpose of input adjustment is 5" W.C. for natural gas or 11" W.C. for propane gas. This furnace requires conversion

for use with propane (see Accessories section on page 35 for correct kit). The maximum inlet gas supply pressure is 10.5" W.C. for natural gas and 13" W.C. for propane. Gas input must never exceed the value shown on the furnace rating plate.

These units are rated for outlet (manifold) pressures of 1.7" W.C. (1st stage) and 3.5" W.C. (2nd stage) for natural gas. When these furnaces have been converted for use with propane gas, the outlet pressures are 4.9" W.C. (1st stage) and 10.0" W.C. (2nd stage).

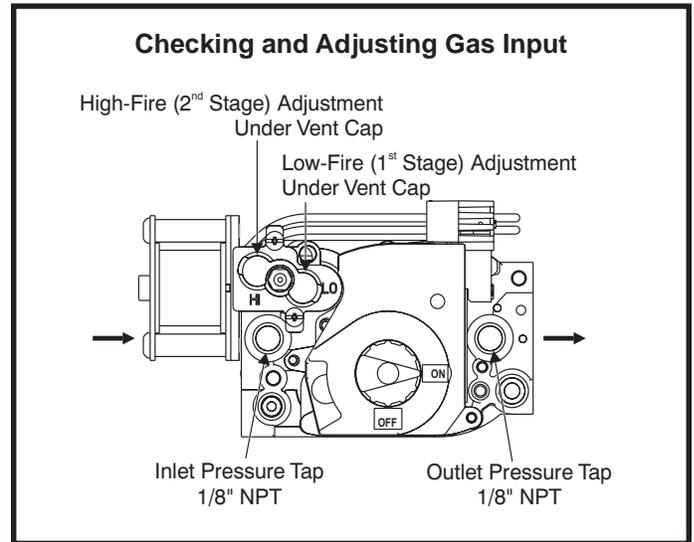


Figure 42

To measure inlet or outlet pressure, remove plug from desired pressure tap (inlet or outlet) as shown in Figure 42 and connect a water manometer or gauge to the proper pressure tap.

These models have separate adjusting screws (3/32" hex) for 1st stage (marked "LO") and 2nd stage (marked "HI"). The adjusting screws are positioned on either side of the barbed fitting (see Figure 42). Turn the adjusting screws clockwise to increase pressure and input; counterclockwise to decrease pressure and input. The pressure regulator adjustment is sensitive; one turn of the adjusting screw will result in a relatively large change in manifold pressure.

To adjust the regulator:

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

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

CAUTION

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

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

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

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

For Propane Gas: The only check for the furnace rate is to properly adjust the manifold pressure using a manometer and Table 4. Typical manifold set point for installations at altitudes from 0 to 4500 feet above sea level is 10.0" w.c.

Temperature Rise

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

High Altitude

In both the United States and Canada, this furnace is approved for operation at altitudes from 0 to 4500' above sea level without any required modifications. From 4500' to 7500', the gas manifold pressure needs to be adjusted according to the information shown in Table 4. To adjust the manifold pressure, refer to section Checking and Adjusting Gas Input. For installations above 7500', call Technical Service at 1-800-448-5872 for assistance.

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

For installation above 4,000 ft. refer to section **Vent Pipe Size and Length** on page 7 and Figure 4 on page 7 **Vent Pipe Sizing**.

Emergency Replacement Motor Operation (G2D95CT/U Models Only)

If the variable speed motor in a G2D95CT/U furnace needs to be replaced in an emergency situation (such as "no heat") and an exact replacement motor is not immediately available, a standard PSC motor of equivalent frame size, voltage, rotation, and horsepower can be **temporarily** installed until the correct replacement motor can be obtained.

Manifold Pressure vs. Altitude

Altitude (ft.)	Natural Gas			Propane			Input Factor
	Heating Value* (Btu/ft ³)	Manifold Pressure Low Fire (in. w.c.)	Manifold Pressure High Fire (in. w.c.)	Heating Value* (Btu/ft ³)	Manifold Pressure Low Fire (in. w.c.)	Manifold Pressure High Fire (in. w.c.)	
2000	948	1.70	3.50	2278	4.90	10.00	0.9666
3000	914	1.70	3.50	2196	4.90	10.00	0.9499
4000	881	1.70	3.50	2116	4.90	10.00	0.9332
4500	865	1.70	3.50	2077	4.90	10.00	0.9249
5000	849	1.61	3.29	2039	4.61	9.41	0.8900
5500	833	1.60	3.27	2000	4.58	9.35	0.8790
6000	818	1.59	3.25	1964	4.55	9.29	0.8680
6500	802	1.58	3.23	1927	4.53	9.24	0.8570
7000	787	1.57	3.21	1891	4.50	9.18	0.8460
7500	771	1.56	3.19	1853	4.47	9.12	0.8350

* Consult local utility for actual heating value.

Furnace Input = Input Factor x Nameplate Input

Above 7500 feet, call Technical Services at 1-800-448-5872.

Table 4

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

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

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

MAINTENANCE

⚠ WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD

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

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

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

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

Filters

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

Lubrication

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

Condensate Collection and Disposal System

Check the condensate drain line periodically for blockage. Visual inspection of condensate flow can be done easily while the furnace is in operation. Use a flashlight to illuminate the discharge end of the condensate drain that is placed in the sewer opening. If the condensate drain line becomes blocked or plugged, the furnace will not operate properly.

Burners

Light the burners and allow to operate for a few minutes to establish normal burning conditions. Observe the burner flames. Compare this observation to Figure 43 to determine if proper flame adjustment is present. Flame should be predominantly blue in color and strong in appearance. Check that all burners are lit, and that the flame does not impinge on the sides of the heat exchanger.

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

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

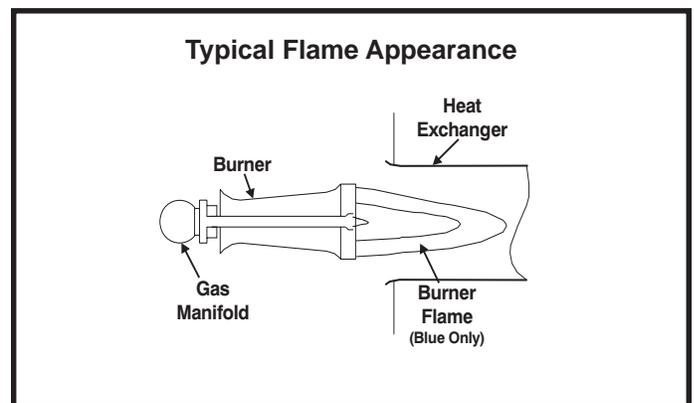


Figure 43

System Sentry™ CONTROL DIAGNOSTICS

Troubleshooting

Make the following visual checks before troubleshooting:

1. Check to see that the power to the furnace and the integrated ignition/blower control board is ON.
2. The manual shutoff valves in the gas line to the furnace must be open.
3. Make sure all wiring connections are secure.
4. Review the Sequence of Operation (see page 27).

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

The furnace has a built-in, self-diagnostic capability. If a system problem occurs, a fault code is shown by a red LED on the control board. The control continuously monitors its own operation and the operation of the system. If a failure occurs, the LED will indicate the failure code. The flash codes are presented in Table 5.

Fault Code History Button

The control stores the last five fault codes in memory. A pushbutton switch is located on the control (see Figure 44 on page 35 or Figure 46 on page 37). When the pushbutton switch is pressed and released, the control flashes the stored fault codes. The most recent fault code is flashed first; the oldest fault code is flashed last. To clear the fault code history, press and hold the pushbutton switch in for more than 5 seconds before releasing.

High Heat State LED

On these models, a green LED is provided on the control board to indicate high heat state (see Table 6).

CFM LED (G2D95CT/U Models Only)

On G2D95CT/U models, an amber LED is provided on the control board to display CFM. To determine what CFM the motor is delivering at any time, count the number of times the amber LED flashes. Each flash signifies 100 CFM; count the flashes and multiply by 100 to determine the actual CFM delivered (for example: 10 flashes x 100 = 1000 CFM).

Failure Codes – Red LED

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

Table 5

High Heat State – Green LED

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

Table 6

REPAIR PARTS

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

Control Group

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

Heat Exchanger Group

- Heat exchanger – primary
- Heat exchanger – secondary
- Condensate drain pan (header box)

Blower Group

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

Burner Group

- Gas manifold
- Burner orifices
- Burners

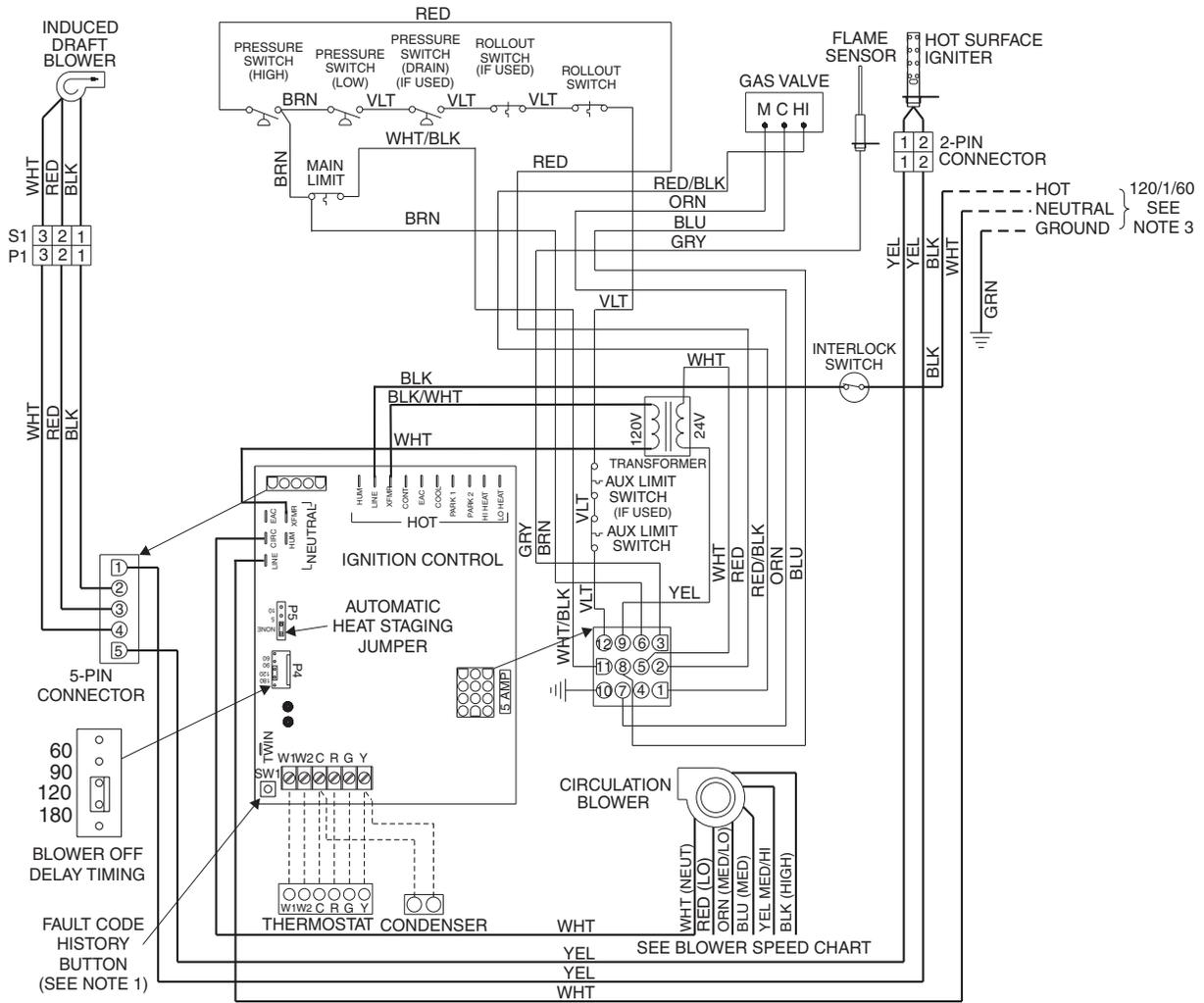
Accessories

- ALPKT583 Natural Gas to Propane Conversion Kit
- ANGKT556 Propane to Natural Gas Conversion Kit
- AFITLHA7 Single Side Filter Frame Kit
- AFILT524 Side Return Filter Kit
- AFILT529 Bottom Return Filter Kit
- AFOSL500 Fossil Fuel Kit

Concentric Vent Kits

- ACVK2 For US Applications only
For Canadian Application use
IPEX Kit 196005 locally available *

* For a local IPEX Canadian Customer Service Center and Kit availability call IPEX at 1-866-473-9462.



NOTES:

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

BLOWER SPEED CHARTS

80% AFUE

MODEL	COOLING	2ND STAGE HEAT	1ST STAGE HEAT
50D12	BLK	BLU	RED
75D14	BLK	BLU	RED
100D14	BLK	YEL	RED
100D20 *	BLK	BLU	ORN
125D20 *	BLK	BLU	ORN
150D20 *	BLK	YEL	ORN

93% AFUE

MODEL	COOLING	2ND STAGE HEAT	1ST STAGE HEAT
40D12	BLK	BLU	RED
60D12	BLK	BLU	RED
80D16 *	BLK	ORN	RED
80D20 *	BLK	ORN	RED
100D20 *	BLK	BLU	ORN
125D20 *	BLK	YEL	BLU

* 5 SPEED MOTOR USED ON THESE MODELS

**G2D93CT/U Connection Diagram
P/N 45604-005**

Figure 44

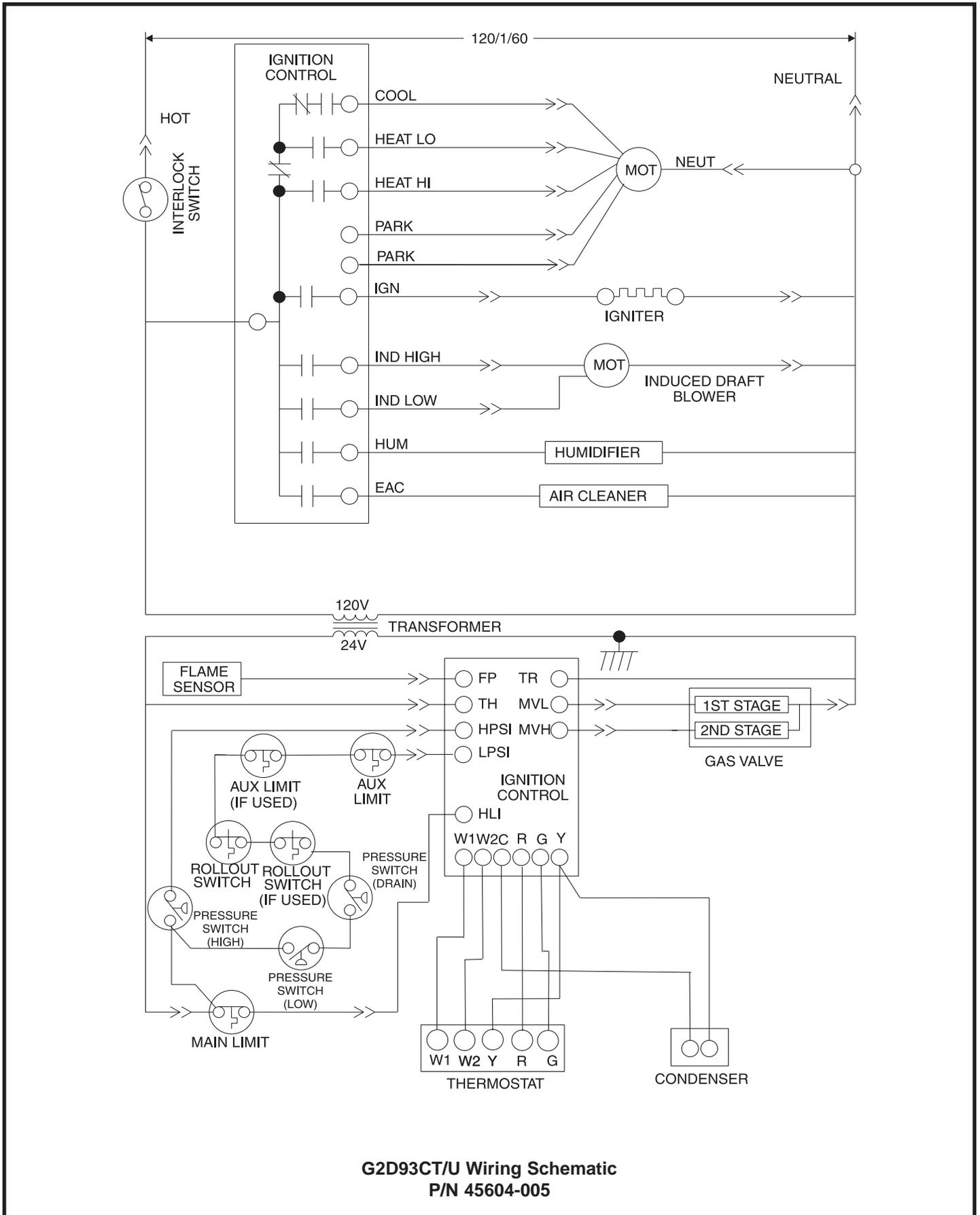
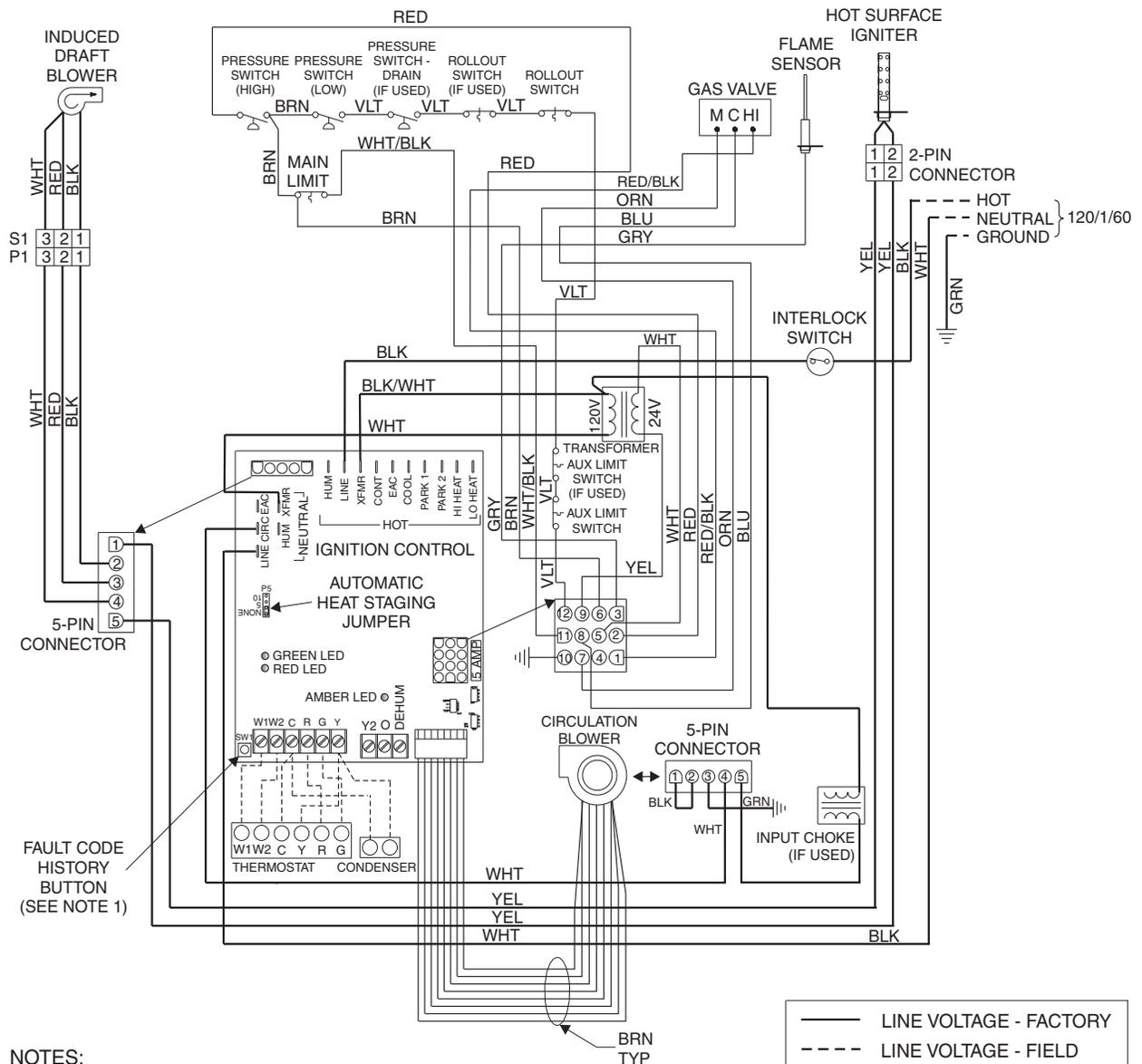


Figure 45



**G2D95CT/U Connection Diagram
P/N 46131-004**

Figure 46

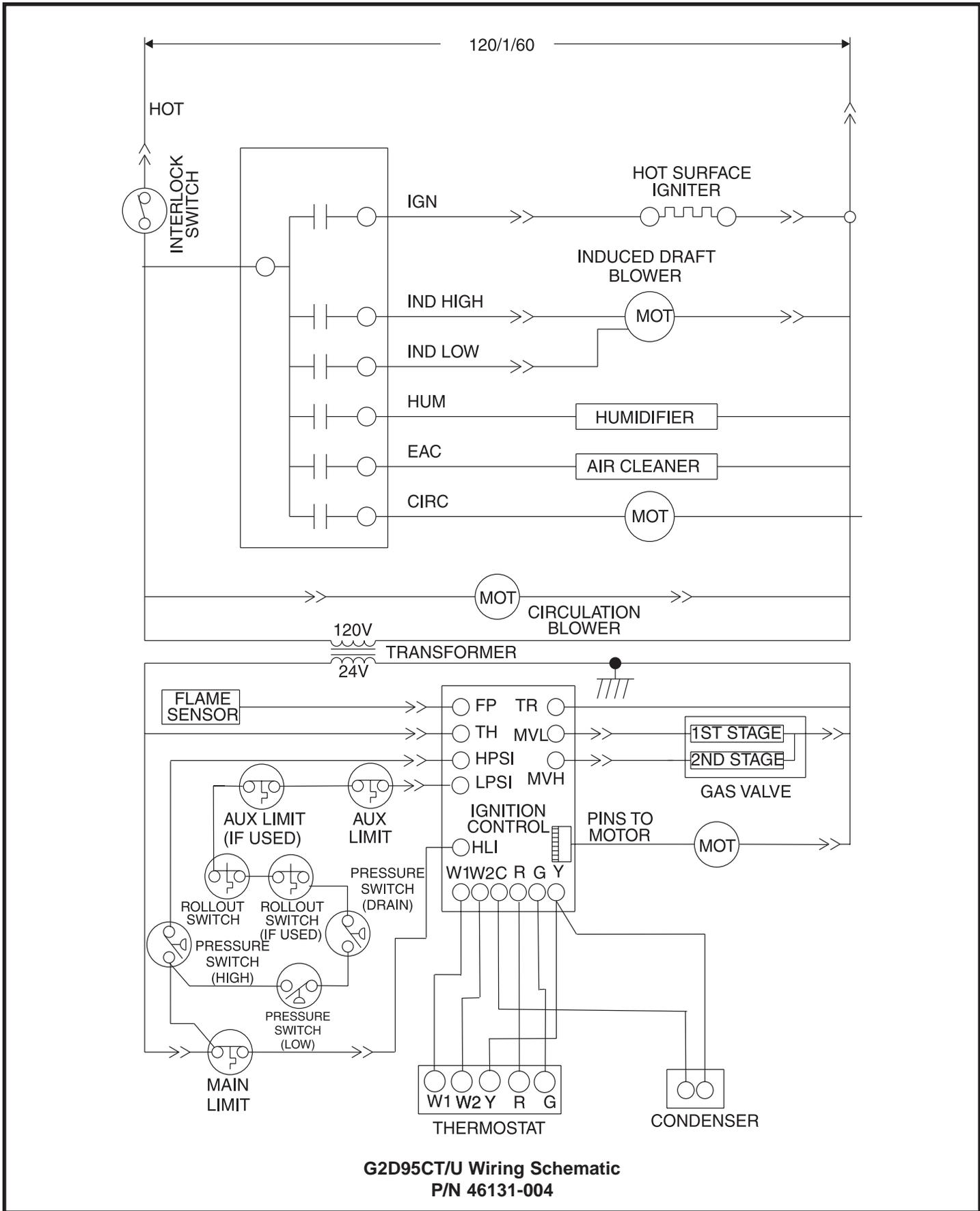


Figure 47

FOR MASSACHUSETTS ONLY

▲ IMPORTANT

For Side Wall Horizontal Venting

The installation must comply with 248 CMR 5.08 Modifications to sections of NFPA-54, Chapter 10 as listed below.

- * “a) 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 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 horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter 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 horizontal 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 back-up may be installed on the next adjacent floor level.
 - b. In the event that the requirements of this subdivision can not 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.
- (b) **EXEMPTIONS:** The following equipment is exempt from 248 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.”

** (c) MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM PROVIDED. When the manufacturer of Product Approved side wall horizontally vented gas 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.

(d) MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED. When the manufacturer of a Product Approved side wall 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 identification of each "special venting system" shall include the listing of either the website, phone number or manufacturer's address where the venting system installation instructions can be obtained; and
2. The "special venting systems" shall be Product Approved by the Board, and the instructions for provided with that system shall include a parts list and detailed installation instructions.

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

* Text from Commonwealth of Massachusetts Official Website of the Office of Consumer Affairs & Business Regulation (OCABR).

** Text from Joseph A Peluso, Jr. (Executive Director Board of State Examiners of Plumbers and Gas Fitters, Commonwealth of Massachusetts) letter of April 24, 2007 to GAMA.