

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



HD and HT SERIES DUCT FURNACE



ANSI Z83.8 (2016) – CSA 2.6 (2016) Gas-Fired Duct Furnace



WARNING:

FIRE OR EXPLOSION HAZARD

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

Be sure to read and understand the installation, operation and service instructions in this manual.

Improper installation, adjustment, alteration, service or maintenance can cause serious injury, death or property damage.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance
- Do not touch any electrical switch; do not use any phone in your building
- Leave the building immediately
- Immediately call your gas supplier from a phone remote from the building. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation must be performed by a qualified installer, service agency or gas supplier.

This manual must be kept with the appliance for future reference.



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HD-IOM-Man-2016-5

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Inspection on Arrival

This furnace was test operated and inspected at the factory prior to crating and was in satisfactory working order. A copy of the Test and Inspection sheet is included in the information package provided. Inspect the packaging on delivery for any signs of damage. Report any damage immediately to the transporting agency. After uncrating inspect furnace for any concealed damage.

Preparing for Installation

The type of gas for which the furnace is equipped, the input rating and electrical ratings are shown on the unit rating plate. Before installation, be sure that the available gas and electrical supply match the rating plate information.

Read this manual in its entirety before beginning installation. Check with local gas utility or agencies having jurisdiction to determine if there are local requirements covering installation of duct furnaces.

Installation Codes

The duct furnace covered in this manual is design certified by Intertek Testing Services / ETL and Underwriters Laboratories (UL) for commercial or industrial use in the United States and Canada.

These units must be installed in accordance with local building codes, the National Fuel Gas Code (NFPA54 / ANSI Z223.1) or in Canada with the Canadian Natural Gas and Propane Installation Code (CSA B149.1).

HD and HT models are available for indoor and outdoor installations depending on configuration. Be sure appliance is properly located.

DANGER !

Do not install duct furnace where it may be exposed to potentially explosive or flammable vapors.

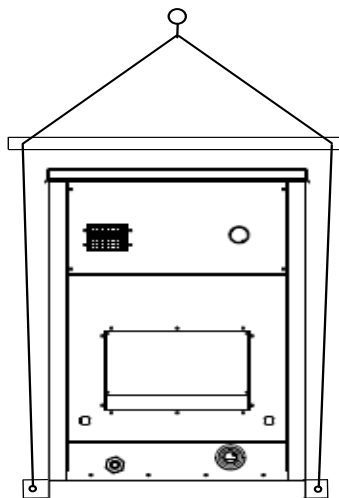
IMPORTANT

Do not locate unit in areas where corrosive vapors (such as chlorinated, halogenated, or acidic) are present in the atmosphere or can be mixed with combustion air entering heater.

Lifting and Placing Unit

Insert spreader bars through U channels at base of furnace. Attach lifting cables to spreader bars, insuring that cables do not contact furnace sheet metal enclosure. See Figure 1

Figure 1



INSTALLATION - Unit Location / Clearances

Duct furnace **must** be installed on the positive pressure side of the circulating blower.

Furnace must be installed in a level, horizontal position. Be sure that structural support is adequate for the unit weight..

The heating section needs an ample supply of air for proper and safe combustion of the fuel gas. Do not block or obstruct air openings to the area where the heating unit is installed. Locate unit to insure an adequate supply of fresh air to replace air used in the combustion and ventilation process.

Unit must also be located to provide suitable clearances to combustible construction as follows:

Sides and back: 6 inches (152mm) **Bottom:** 2 inches (51mm) **Top:** 6 inches (152mm) **Front:** 24 inches (635mm)

When locating the heating unit, be sure to provide ample room for access and servicing of operating controls, gas train and electrical components.

Do not install duct furnace in locations where flue products can be drawn into adjacent building openings such as windows, fresh air intakes or doors.

A condensate drain fitting is provided in the flue box. If duct furnace is located downstream of a cooling / refrigeration system or if a modulating control system is used, a **drain tube must be connected** to this fitting to drain condensate formed in tubes during air conditioning or heater operation. The drain tube should be pitched $\frac{1}{4}$ " per foot toward the drain discharge point.

Mounting the Duct Furnace

The duct furnace is provided with channels on the base to provide for floor mounted installations. These channels provide the required minimum clearance to combustible floor surfaces. **DO NOT** remove channels attached to base of cabinet.

Direction of Airflow

Marking is provided on the heater cabinet indicating the proper direction of airflow. Be sure that unit is properly aligned with air distribution fan.

A **circulating airflow proving switch must be installed** in duct upstream of duct furnace to prove circulating airflow. See "Controls" section for additional information on locating air probe.

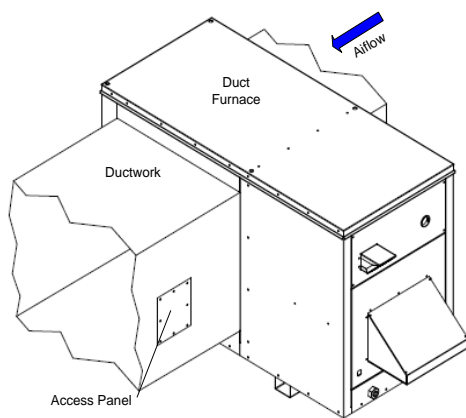
Duct Installation

Duct work should be sized to fit flanged opening on the duct furnace. Ductwork should be mechanically fastened to heating unit. Joints should be sealed with high temperature silicone caulking or high temperature tape to prevent leakage of circulating air. All duct connections **MUST** be weathertight to prevent rain and snow from entering ductwork.

Support all ductwork securely. **DO NOT** rely solely on heating unit duct connections or support.

Provide removable access panels in ductwork immediately upstream and downstream of duct furnace to allow for inspection of the heat exchanger. These openings should be large enough to observe smoke or reflected light inside the casing to inspect heat exchanger for leaks, and to check for hot spots on the heat exchanger due to poor air distribution or insufficient air volume. Attach covers so as to prevent air leakage. See Figure 2.

Figure 2

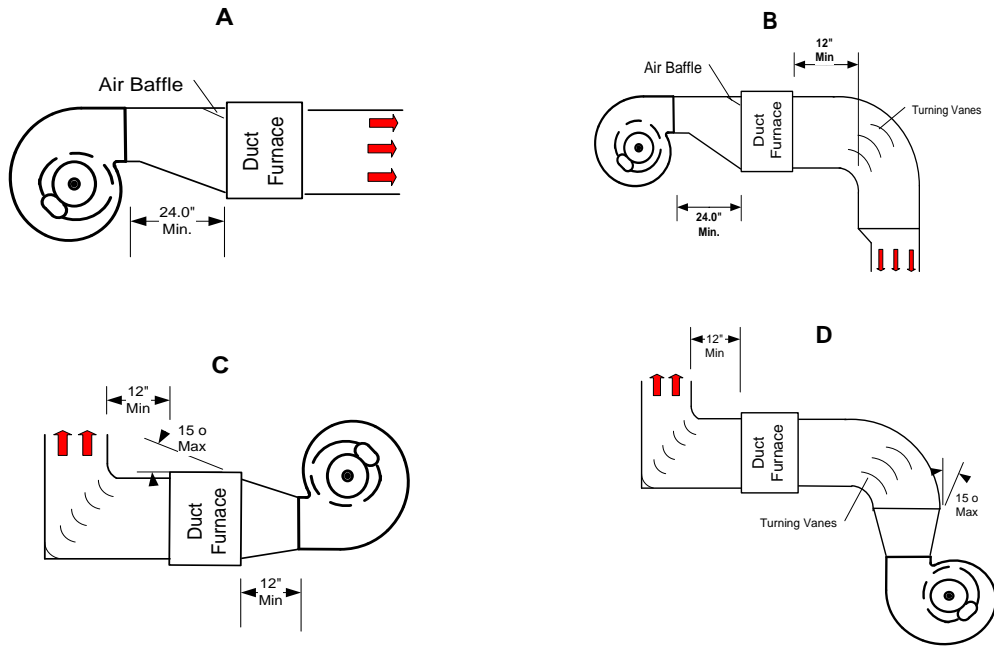


Minimum distance to downstream components rated less than 250 °F (121 °C) is 3 feet (.9m).

Airflow Distribution

Uniform air distribution over the heat exchanger is essential to proper operation and optimum unit efficiency. Use of baffles and/or turning vanes may be required to provide uniform air flow through the heating unit. See Figure 3 A–D below. Observe recommended spacing from circulating air blower to heating unit. Locating the circulating air blower too close to the unit creates uneven airflow over the heat exchanger resulting in poor performance and possible damage to heat exchanger from localized overheating.

Figure 3



Airflow Requirements

The duct furnace must be installed on the positive pressure side of the field supplied circulating air blower. The air throughput must be within the CFM range marked on the heater rating plate.

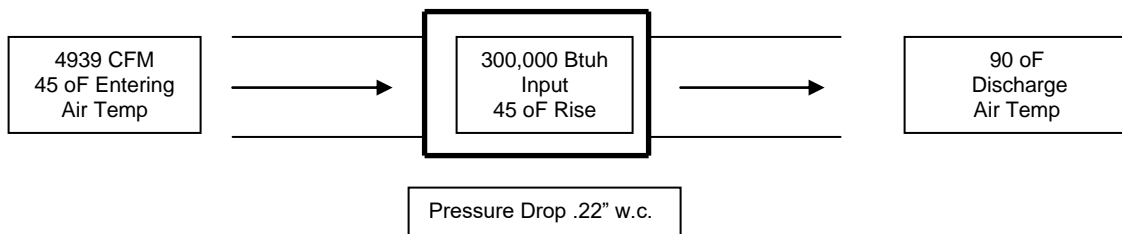
For modulating applications variable air flow is preferred. In constant volume airflow systems a dampered air bypass may be required to reduce airflow over furnaces, to provide necessary airflow across modulating furnace.

Multiple Heater Installations

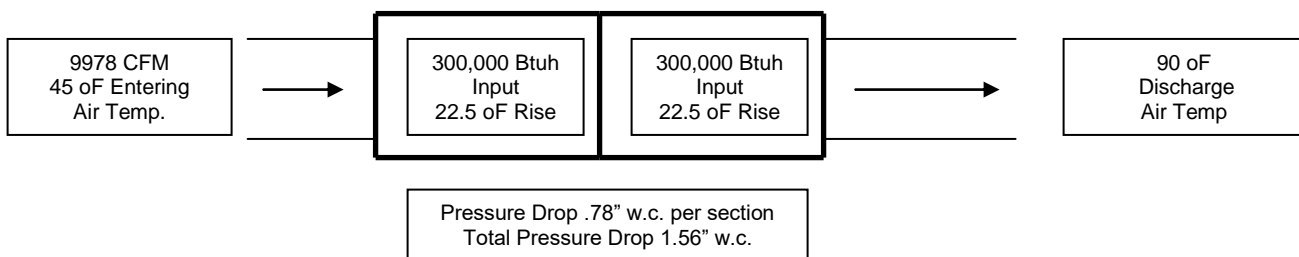
Multiple Heaters may be installed individually, in tandem or in parallel. Refer to examples in Figure 4 for recommended configurations. The maximum allowable discharge air temperature is 160 oF for any single or multiple heater installation. Maximum design duct static pressure is 3.0" w.c.

Figure 4

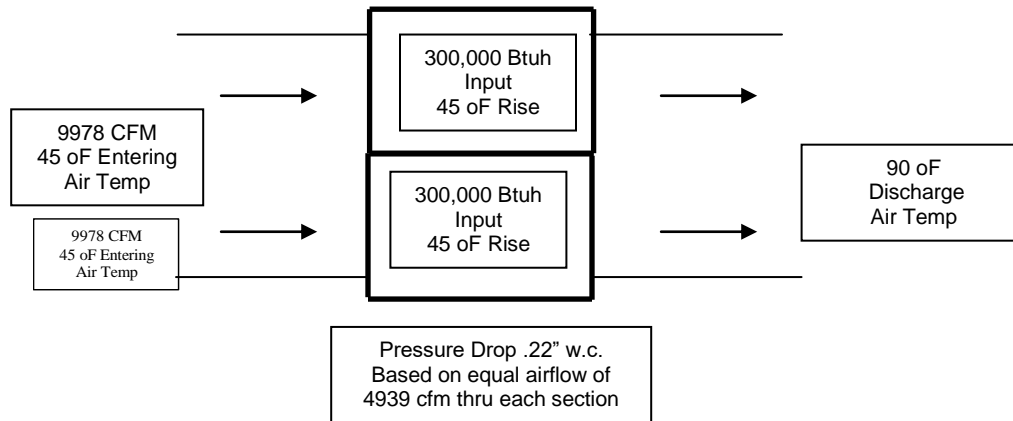
Single Unit – Top View



Tandem Unit Top View



Parallel Unit – Top View



Condensate Drains

1. In applications operating with modulating controls, temperature rises below 40 oF, or with outside make-up air, some condensation may occur in the heating cycle. **Flue gas condensate is corrosive and will result in shortened heat exchanger life.** In these applications connection of a condensate drain line is required to avoid condensate buildup and possible heat exchanger damage. If condensate drain lines are run through unheated spaces, apply heat tape to prevent condensate from freezing.
2. If heating section is located downstream of a refrigeration system or cooling coil, condensation can occur during operation of the air conditioning. Conditioned air cools heat exchanger tube surfaces resulting in condensation from warm, moist air in the heat exchanger tubes and flue collector. This condensate is not harmful to the heat exchanger provided it is drained continuously. For these applications a ¼ NPT connection is provided for attachment of condensate drain line to remove condensate from heat exchanger.
3. In furnace modules with bottom mounted horizontal burner, condensate will drain from the open end of the tubes. A condensate collection pan which attaches to the burner assembly is available as an option.
4. Disposal of condensate is subject to local codes and ordinances. Some municipalities require that the acidic condensate produced be neutralized before being discharged into the sanitary sewer. A condensate neutralizer kit is available. When neutralizer kits are provided they should be installed where they are readily accessible for inspection and maintenance.

Venting

Outdoor Installations (Style W, N)

Outdoor furnaces must be individually vented.

The venting system is designed for direct discharge of flue gases to the outdoors. The vent discharge opening should be located to provide an unobstructed discharge to the outside and should be located as far from the combustion air inlet as possible but in the same pressure zone.

Vent duct should pitch down toward outlet, to insure that any condensate that occurs in vent duct drains away from combustion blower fan housing. The duct opening should be protected by a ½ in. x ½ in. (12mm x 12mm) mesh screen. An optional rain hood may be used over the discharge opening to prevent wind driven rain from entering the vent duct, but should not intersect the flue gas discharge path.

Where sufficient clearance for proper horizontal venting cannot be provided, or in jurisdictions requiring a 4 foot separation between flue gas discharge and combustion air inlet, flue gases need to be vented vertically. Refer to Figure 6 for suitable venting method. A vent adaptor is required to transition from the rectangular ID fan discharge to round vent pipe. Joints in the vestibule must be sealed.

Vent pipe must terminate at least 1 ft. above the cabinet. The vent must be located on the same side of the appliance as the combustion air inlet opening. Condensation in the vent pipe is likely during heater start-up cycle and provision for drainage must be provided in closed vent piping.

Figure 5 – Outdoor Horizontal Venting – Style W

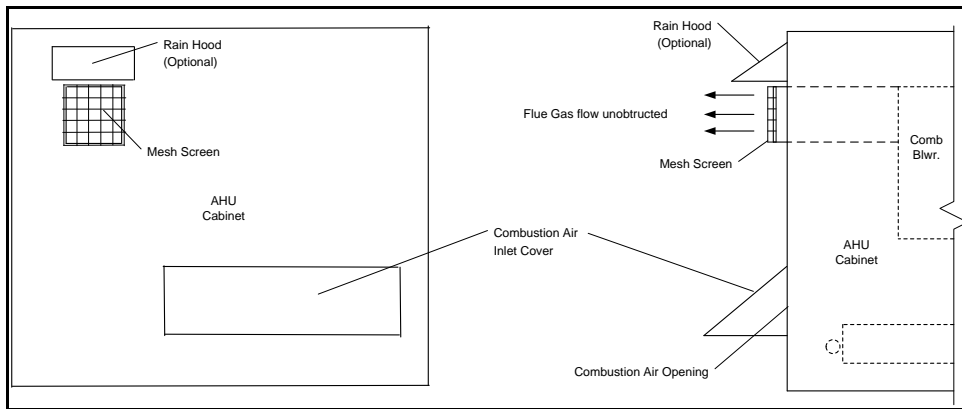
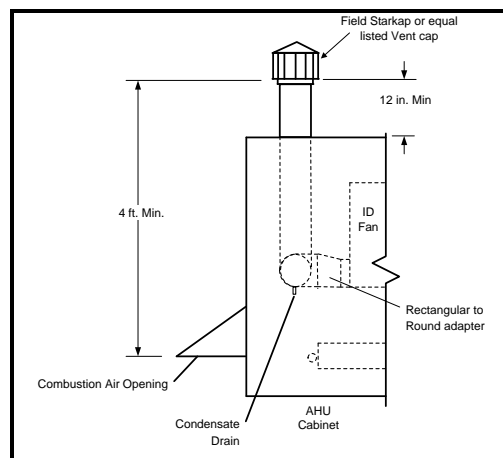


Figure 6 – Outdoor Vertical Venting – Style N



Indoor Installations (Style K, S)

All duct furnaces installed indoors must be connected to a venting system to convey flue gases outside of the heated space. Proper venting of the heating units is the responsibility of the installer. **Vent piping is supplied by others.**

Installation of the venting system must conform to the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA B149.1 in Canada, and local building codes.

A collar is provided on each furnace for attachment of vent piping as listed in Table 1 based on input rating.

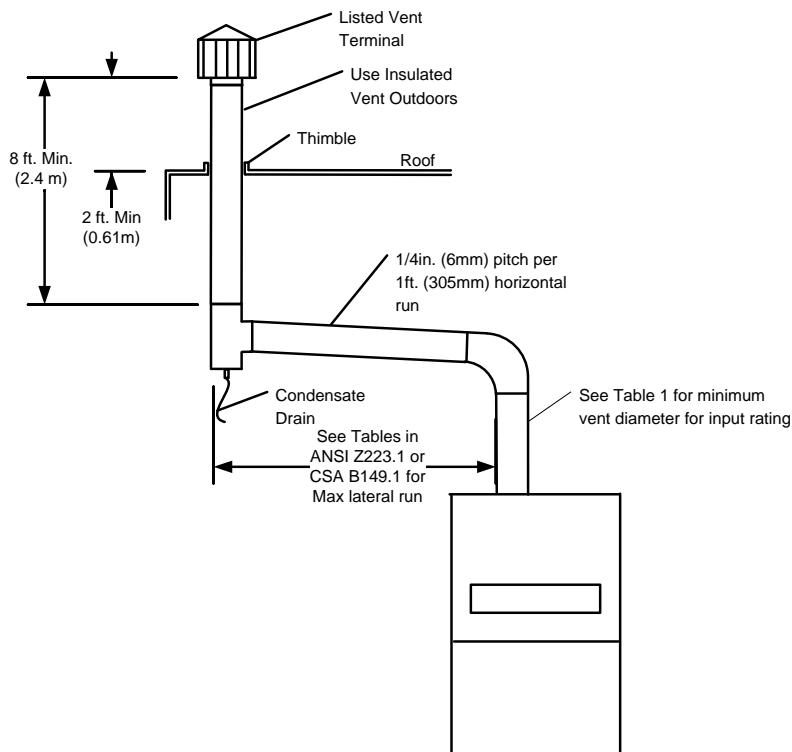
Table 1 -Vent Sizing

Models	Input Rating (Btuh)	Input Rating (W)	Vent Pipe Dia.
HD(D,G) 050-175; HTG050-160	50,000 – 175,000	14653 – 51287	5 in. (126 mm)
HDG200-400, HDD200; HTG200-360	200,000 – 400,000	58614 – 117228	6 in. (152 mm)
HD(A,B)150-400; HTA150-400	150,000 – 400,000	43960 – 117228	6 in. (152 mm)
HD(A,B)450-600; HTA500; HTG440	440,000 – 600,000	131881 – 175842	7 in. (178mm)

Vertically Vented Duct Furnaces – Category I

1. Refer to Table 13.1 (a) in ANSI Z223.1 or Table C.1 in CSA B149.1 for vent pipe sizing. HD and HT furnaces are fan-assisted. Use “FAN” column for maximum and minimum input base on vertical and lateral vent pipe runs.
2. Maximum vent lengths are based on total equivalent length of pipe which must include fittings and elbows. Equivalent length of 5 or 6 inch elbows is 5 ft. (1.5 m), and for a 7 inch elbow is 7 feet (2.13 m).
3. The top of the vent pipe must extend at least **two (2) feet** (0.61m) above the highest point on the roof.

Figure 7 – Indoor Vertical Venting (Category I)



4. Horizontal runs should be pitched upward $\frac{1}{4}$ " **per foot** (21mm/m) and should be supported at **3 foot** (1m) maximum intervals.
5. Install a tee fitting at the low point of the vertical section with a drip leg and cleanout cap.
6. Vent must terminate in a Listed, weatherproof vent cap.
7. Vent connectors serving Category 1 heaters must not be connected into any portion of a mechanical draft system operating under positive pressure. Dampers must not be used in vent piping runs. Spillage of flue gases into the occupied space could result.

Horizontally Vented Duct Furnaces -Category III

Vent pressures in horizontally vented furnaces are positive and therefore are classified as **Category III** venting systems in accordance with ANSI standards. All vent pipe joints must be sealed to prevent leakage of flue gases into the heated space.

Use only Category III vent materials listed to UL1738 / ULC S636 for vent pipe and fittings.

All field installed vent pipe and fittings must be from the same manufacturer. DO NOT intermix vent system parts from different vent manufacturers. Follow instruction provided with approved venting materials used.

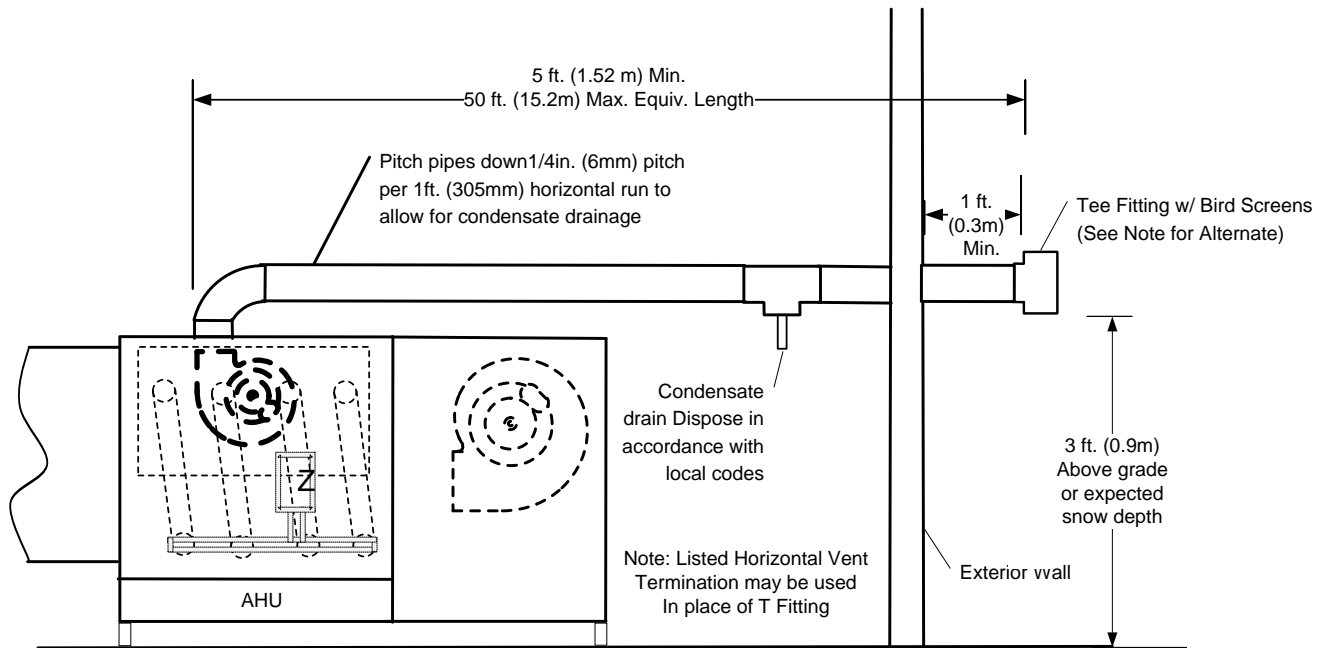
Seal joint at connection to flue collar with a high temperature silicone sealant with temperature rating of 500 oF.

The total equivalent length of vent pipe must not exceed **50 ft.** (15.25m). Equivalent length of 5 or 6 inch 90o elbows is 5 ft. (1.5 m), and for a 7 inch 90o elbow is 7 feet (2.13 m). 45o Elbows are half of the equivalent length of 90o.

The vent system must also be installed to prevent collection of condensate. Pitch horizontal pipe runs downward $\frac{1}{4}$ **in. per foot** (21mm per meter) toward the outlet to permit condensate drainage. Maintain **6 in.** (152mm) clearance between vent pipe and combustible materials.

EACH DUCT FURNACE MUST HAVE ITS OWN INDIVIDUAL VENT PIPE AND TERMINAL. Do not connect vent system from horizontally vented units to other vent systems or a chimney.

Figure 8 – Indoor Horizontal Venting



1. A Tee Fitting termination or Vent Cap listed for horizontal venting must be provided.
2. Termination fitting inlet diameter must be same as the required vent pipe diameter. The vent terminal must be at least **12 in.** (305mm) from any exterior wall to prevent degradation of building material by flue gases.
3. The vent terminal must be located at least **3 ft.** (1m) above grade, or in snow areas, above snow line to prevent blockage. Additionally, the vent terminal must be installed with a minimum horizontal clearance of **4 ft.** (1.2m) from electric meters, gas meters, regulators or relief equipment.
4. Through the wall vents shall not terminate over public walkways, or over an area where condensate or vapor could create a nuisance or hazard.

Two-Pipe Separated Combustion Systems

The furnace must be mounted with the burner section in a reasonably airtight vestibule compartment, as these systems provide combustion air from outside the heated space and vent the products of combustion outdoors. Additionally the heating unit must include the following:

- 1.) For vent pipe and fittings conveying flue gases, **use only Category III vent materials listed to UL1738 / ULC S636 from same vent manufacturer. DO NOT** intermix vent system parts from different vent manufacturers. Follow instruction provided with approved venting materials used.
- 2.) For combustion air piping, use of 24 gauge galvanized steel single wall pipe is acceptable. Tape joints with aluminum foil tape and secure with corrosion resistant screws.
- 3.) Inlet air pipe must be same size as exhaust vent pipe based on input ratings.
- 4.) Exhaust and vent piping must not exceed a combined **50 equivalent feet** in length.
- 5.) See Figures 9 or 10 for recommend vent terminations and air inlet fittings for venting configuration. Proper installation of air inlet and flue gas exhaust piping are essential to proper operation of the heat module.
NOTE: The inlet and outlet terminals must be located in the same pressure zone to provide for safe appliance operation.

Separated combustion systems may not be common vented. Each heater must have its own individual air supply and flue gas exhaust vent.

If vent system application does not meet the criteria outlined in the diagrams and information provided, contact a manufacturer of venting systems and materials for assistance with system design.

Figure 9 – Vertical Venting

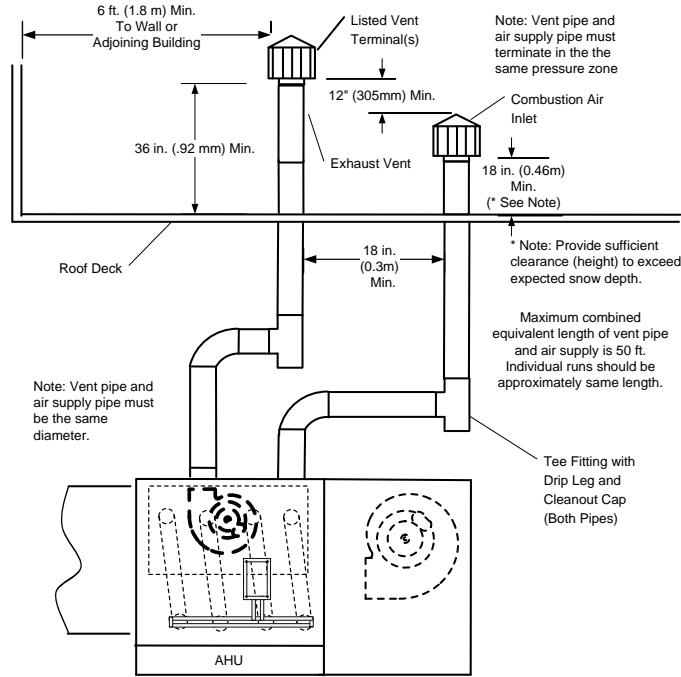
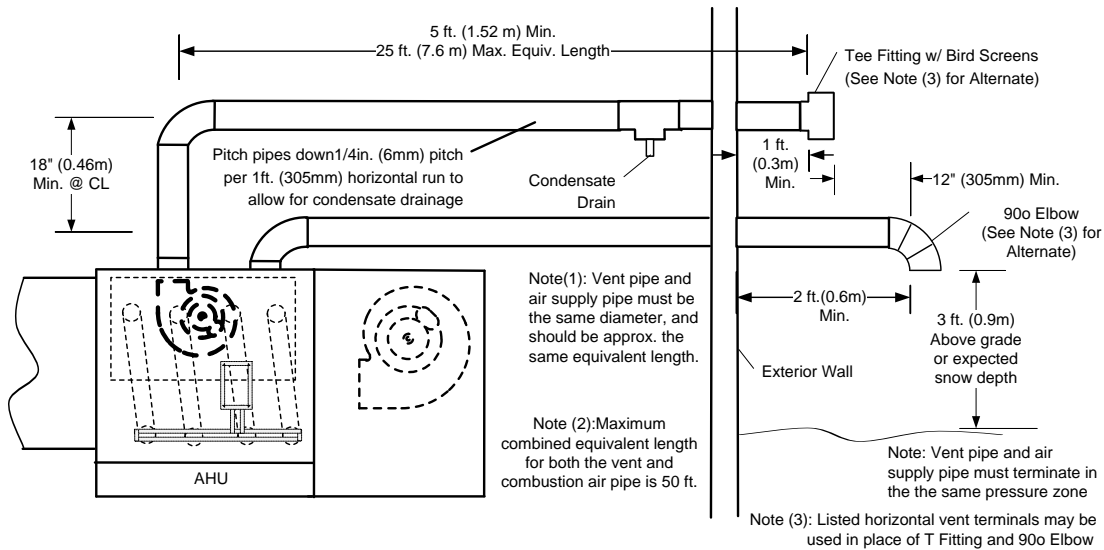


Figure 10 – Horizontal Venting- Separated Combustion



If vent cap terminations are used, be sure that the vent cap used is approved for horizontal application. Certain vent terminals are approved for vertical installation only.

Gas Supply, Piping and Connections

1. Installation of piping must conform with local building codes and ordinances, or in the absence of local codes with ANSI Z223.1 the National Fuel Gas Code. In Canada, installation must be in accordance with CAN/CGA-B149.1 for Natural gas and B149.2 for Propane units.
2. Gas piping must be sized for the total Btu input of all units (heaters) serviced by a single supply.
3. Be sure that gas regulators servicing more than one furnace have the proper pipe and internal orifice size for the total input of all heaters serviced by the regulator. (See Figure 11)
4. **See Table below for Minimum inlet gas pressure required and Maximum permissible supply pressure.**

	Natural Gas	Propane Gas
Minimum (50,000 to 400,000 Btuh models)	5.0" w.c.	11.0" w.c.
Minimum (401,000 Btuh models) and higher	6.0" w.c.	12.0" w.c.
Maximum Inlet Pressure	13.5" w.c.	13.5" w.c.

5. Connect a fitting suitable for connection to a pressure gauge capable of measuring gas pressure to 1/8" NPT tap provided on the inlet side of the manual shut-off valve. (See Figure 12). Measure inlet pressure to each heater serviced by a single regulator with all heaters in operation. (See Figure 11)
6. A drip leg (sediment trap) and a manual shut off valve must be provided immediately upstream of the gas control on the heating unit. To facilitate servicing of unit, installation of a union is recommended.
7. **All gas supply and heater connections must be leak tested prior to placing equipment in service.**

Figure 11

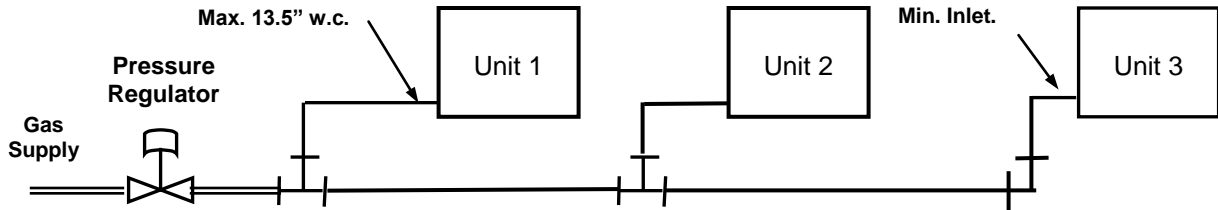
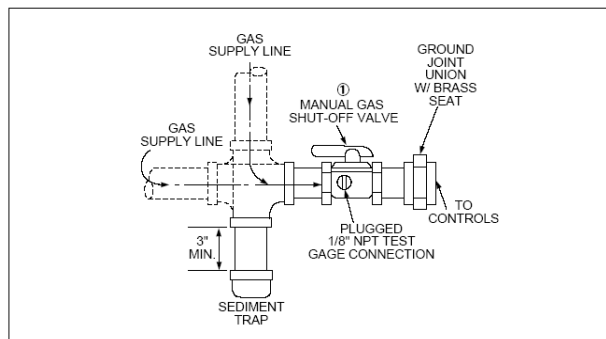


Figure 12



WARNING !

1. All field gas piping must be pressure / leak tested prior to operation. NEVER use and open flame to check for leaks. Use a soap solution or other leak detecting solution for testing.
2. Gas pressure to appliance controls must never exceed 13.5" w.c. (1/2 PSI)

WARNING !

1. When pressure testing at 1/2 PSI or less, close the manual shut-off valve on the appliance before testing.
2. When pressure testing gas supply line at 1/2 PSI or higher, close manual gas valve and disconnect heater from supply line to be tested. Cap or plug the supply line.

Electrical Connections

Installation of wiring must conform to local building codes and the National Electric Code ANSI/NFPA No. 70 in the United States and CSA 22.1, Part 1, Electrical Code in Canada. Unit must be electrically grounded in conformance with these codes. The power supply to the duct furnace should be protected by a fused disconnect switch.

Wiring Diagrams and Control Information

An Installation, Operating and Maintenance Instruction package is provided with this heating unit including wiring diagrams, sequence of operation and control diagnostic information for the control system provided on the duct furnace.

These documents should be left with the duct furnace on the job site for future reference. A wiring diagram is also attached to the inside of the vestibule access panel.

Electrical Supply And Ratings

The furnace control system requires both line voltage and low voltage circuits with correct polarity, and clean neutral and ground. Line voltage readings between L1 and Neutral as well as L1 and Ground should be within +/- 3 volts. Refer to the furnace rating / nameplate for electrical ratings.

WARNING !

- **Disconnect power supply before making wiring connections to prevent electrical shock and possible equipment damage.**
- **Wiring must be in accordance with wiring diagram provided. Altering the wiring could result in a hazard to persons and property.**
- **If any original factory wiring must be replaced, replacement wiring material must have a temperature rating of at least 105 °C.**

Operating & Safety Instructions

Wiring diagram and Sequence of Operation are included in this information package for the specific control system provided on the duct furnace. Refer to these documents before attempting to place in service.

1. This duct furnace does not have a pilot. It is equipped with a direct spark ignition device that automatically lights the gas burner. **DO NOT** try to light burners by hand.
2. **BEFORE OPERATING**, leak test all gas piping up to heater gas valve. Smell around the unit area for gas. **DO NOT** attempt to place furnace in operation until source of gas leak is identified and corrected.
3. Use only hand force to push and turn the gas control knob to the "ON" position. **NEVER** use tools. If knob does not operate by hand, replace gas valve prior to starting the unit. Forcing or attempting to repair the gas valve may result in fire or explosion.
4. Do not attempt to operate unit, if there is indication that any part or control has been under water. Any control or component that has been under water must be replaced prior to trying to start the unit.

Start-up

1. Turn thermostat or temperature controller to its lowest setting
2. Turn off gas supply at the manual shut-off valve
3. Turn off power to the unit at the disconnect switch.
4. Remove access panel or open door to unit vestibule housing the gas heater.
5. Move gas control knob to "Off" position.
6. Install a tapped fitting for attachment to a manometer, or other gauge suitable for 14.0" w.c., in the inlet pressure tap, and for 10.0" w.c., in the manifold pressure tap.
7. Wait 5 minutes for any gas to clear out. If you smell gas, see Step 2 above and correct leak. If you don't smell gas or have corrected any leaks, go to the next step.
8. Turn gas control knob to "On" position
9. Open all manual gas valves
10. Turn power on at disconnect switch
11. Set thermostat or controller to its highest position to initiate call for heat and maintain operation of unit.*
12. Draft inducer will run for a 15 to 30 second pre-purge period (See Sequence of Operation provided)
13. At the end of the pre-purge the direct spark will be energized and gas valve will open
14. Burners ignite.

Inlet Gas Pressure

Verify inlet (line) gas pressure to the combination gas valve provided. A 1/8 NPT tapping is provided on the gas valve for measuring inlet pressure as shown. See Figure 13 for Gas Valve adjustment locations.

Input

The correct heat capacity of the furnace is controlled by the burner orifices and the gas manifold pressure. The manifold pressure is factory set, but should be checked at the time of start-up.

Manifold Pressure Adjustment

A pressure tap is provided in each furnace manifold for measuring the gas manifold pressure. Manifold pressure must be checked at start-up and during any service or maintenance. All control systems operate at a manifold pressure of 3.40 to 3.50 in. w.c. at **maximum input** on Natural Gas, and 10.0 in. w.c. on Propane Gas.

***Note:** If modulating controls are provided on duct furnace, refer to separate set-up sheet included with this manual.

Failure to Ignite

1. On the initial start-up, or after unit has been off long periods of time, the first ignition trial may be unsuccessful due to need to purge air from manifold at start-up.
2. If ignition does not occur on the first trial, the gas and spark are shut-off by the ignition control and the control enters an inter-purge period of 15 to 90 seconds, during which time the draft inducer continues to run.
3. At the end of the inter-purge period, another trial for ignition will be initiated.
4. Control will initiate up to three ignition trials on a call for heat before lockout of control occurs.
5. Control can be brought out of lockout by turning thermostat or controller to its lowest position and waiting 5 seconds and then turning back up to call for heat. Some controls provided will automatically reset after one hour and initiate a call for heat.

Figure 13A – Honeywell VR8305Q Gas Valve

2nd Stage (Hi Fire) Manifold
Pressure Adjustment
(3/32" Allen Key)

1st Stage (Lo Fire) Manifold
Pressure Adjustment

Electrical
Connection Block

1/8" NPT Inlet
Pressure Tap

Manual Shut-off
Control Knob

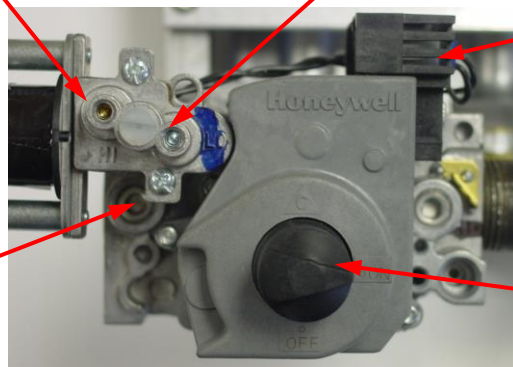


Figure 13B – White Rodgers 36H Gas Valve

1/8" NPT Inlet
Pressure Tap

Manual Shut-off

Electrical
Connection Block

Manifold Pressure Adjustment
Remove Brass cap and adjust
with plastic screw

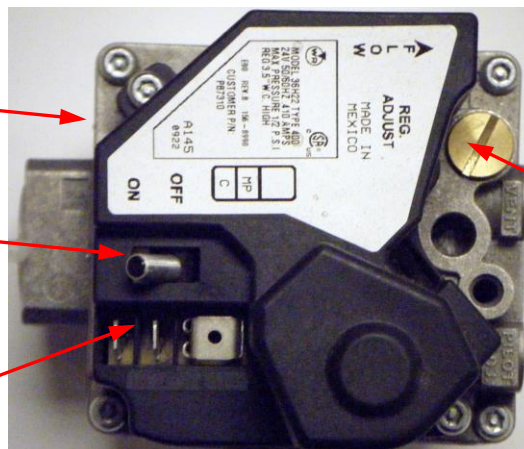
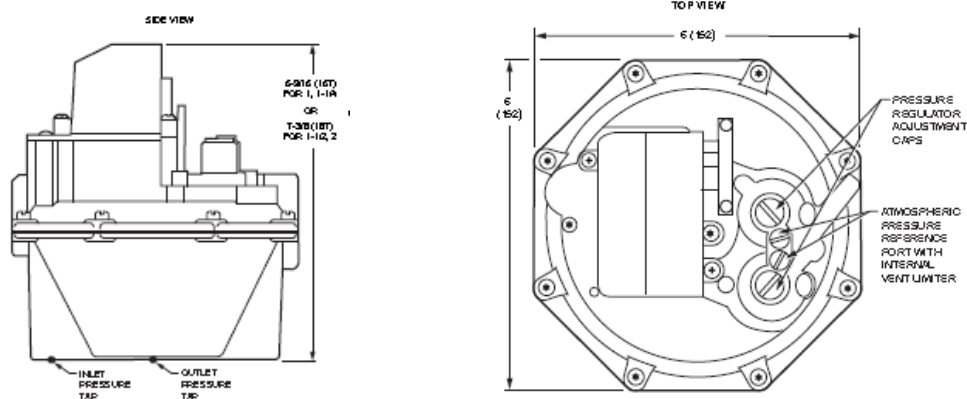


Figure 13 C – Honeywell V8944 Gas Valve

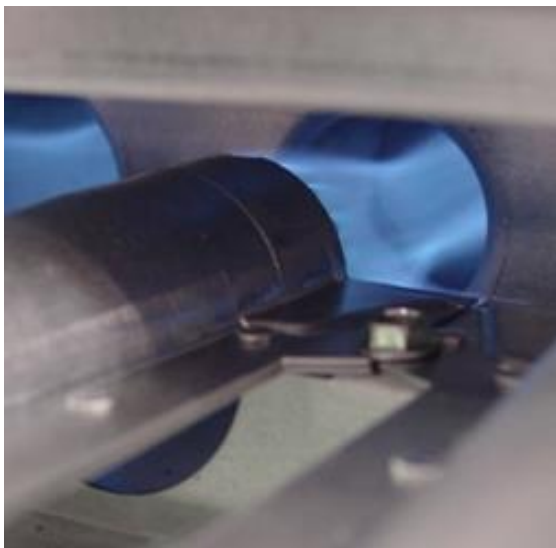


Burner Flames

Prior to completing the start-up, check the appearance of the main burner flame. See Figure 14 below for flame characteristics of properly adjusted Natural gas systems.

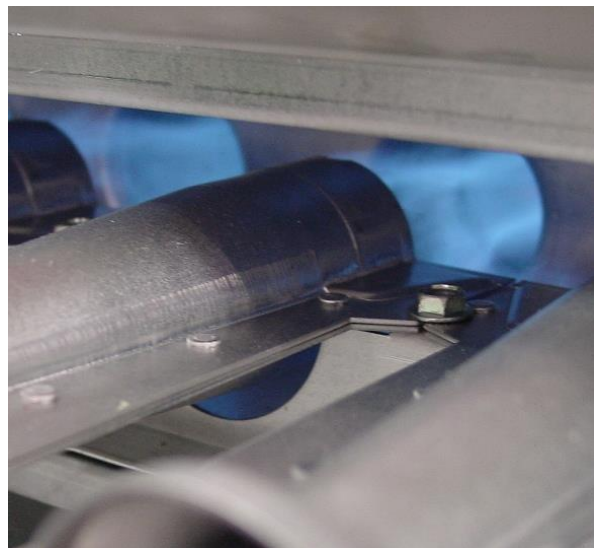
1. The burner flame should be predominately blue in color and well defined and centered at the tube entry as shown in Figure 14. Distorted flame or yellow tipping of natural gas flame, or a long yellow flame on propane, may be caused by lint and dirt accumulation inside burner or at burner ports, at air inlet between burner and manifold pipe, or debris in the main burner orifice. Soft brush or vacuum clean affected areas.
2. Poorly defined, substantially yellow flames, or flames that appear lazy, indicate poor air supply to burners or excessive burner input. Verify gas supply type and manifold pressure with rating plate information.
3. Poor air supply can be caused by obstructions or blockage in heat exchanger tubes or vent discharge pipe. Inspect and clean as necessary to eliminate blockage. Vacuum any dirt or loose debris. Clean heat exchanger tubes with stiff brush. Poor flame characteristics can also be caused by undersized combustion air openings or flue gas recirculation into combustion air supply. Increase air opening size or re-direct flue products to prevent re-circulation.
4. Reduced air delivery can also be the result of fan blade slippage, dirt accumulation the fan blade or low voltage to draft inducer motor. Inspect draft fan assembly and be sure fan blade is secure to motor shaft. Check line voltage to heater.

Figure 14A



Burner Flame @ 1.2" w.c. Manifold Pressure Draft Inducer – High Speed

Figure 14B



Burner Flame @ High Fire 3.5" w.c. Manifold Pressure Draft Inducer – High Speed

Shutdown

1. Set thermostat or controller to lowest setting.
2. Turn off electrical supply to unit at disconnect switch.
3. Turn off manual gas supply.
4. Disconnect manifold and inlet pressure taps and re-install pipe plugs
5. Replace vestibule access panel or close door.

Normal Operation

1. Turn on electrical supply to unit at disconnect switch
2. Turn on manual gas supply
3. Set Thermostat or Temperature controller to desired temperature.
4. Information outlining the normal Sequence of Operation and Wiring Diagram for the control system supplied with the furnace model is enclosed with this instruction.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

Controls

Combustion Air Pressure Switch

A combustion air pressure switch is provided as part of the control system to verify airflow through draft inducer by monitoring the difference in pressure between the draft inducer and the atmosphere. If sufficient negative pressure is not present, indicating lack of proper air movement through heat exchanger, the switch opens shutting off gas supply through the ignition control module. On units with two speed draft inducer operation, a dual air pressure switch is used, monitoring high and low speed pressures. The air pressure switches have fixed settings and are not adjustable.

Rollout Switch (Manual Reset)

The duct furnace is equipped with manual reset rollout switch(es) in the event of burner flame rollout. The switch will open on temperature rise and shut-off gas supply through the ignition control module. Flame rollout can be caused by insufficient airflow for the burner firing rate (high gas pressure), blockage of the vent system or in the heat exchanger. The furnace module should not be placed back in operation until the cause of rollout condition is identified. The rollout switch can be reset by pressing the button on the top of the switch.

High Limit Switch

The duct furnace is equipped with a fixed temperature high limit switch mounted on the vestibule panel that shuts off gas to the heater through the ignition control module in the event of reduced circulating airflow over the heat exchanger. Reduced airflow may be caused by dirty or blocked filters, restriction of the air inlet or outlet to the unit, or incorrect setting of circulating air fan variable frequency drive. The high limit switch will automatically reset when the switch temperature drops to 30°F below the set point. Determine the cause of the reduced air flow and correct.

Ignition Control Module

Ignition control modules are available having a number of different operating functions. Refer to Sequence of Operation sheet provided for a detailed description of the control features for the model control installed.

Additional recommended safety interlocks

Circulating Air Flow Proving Switch

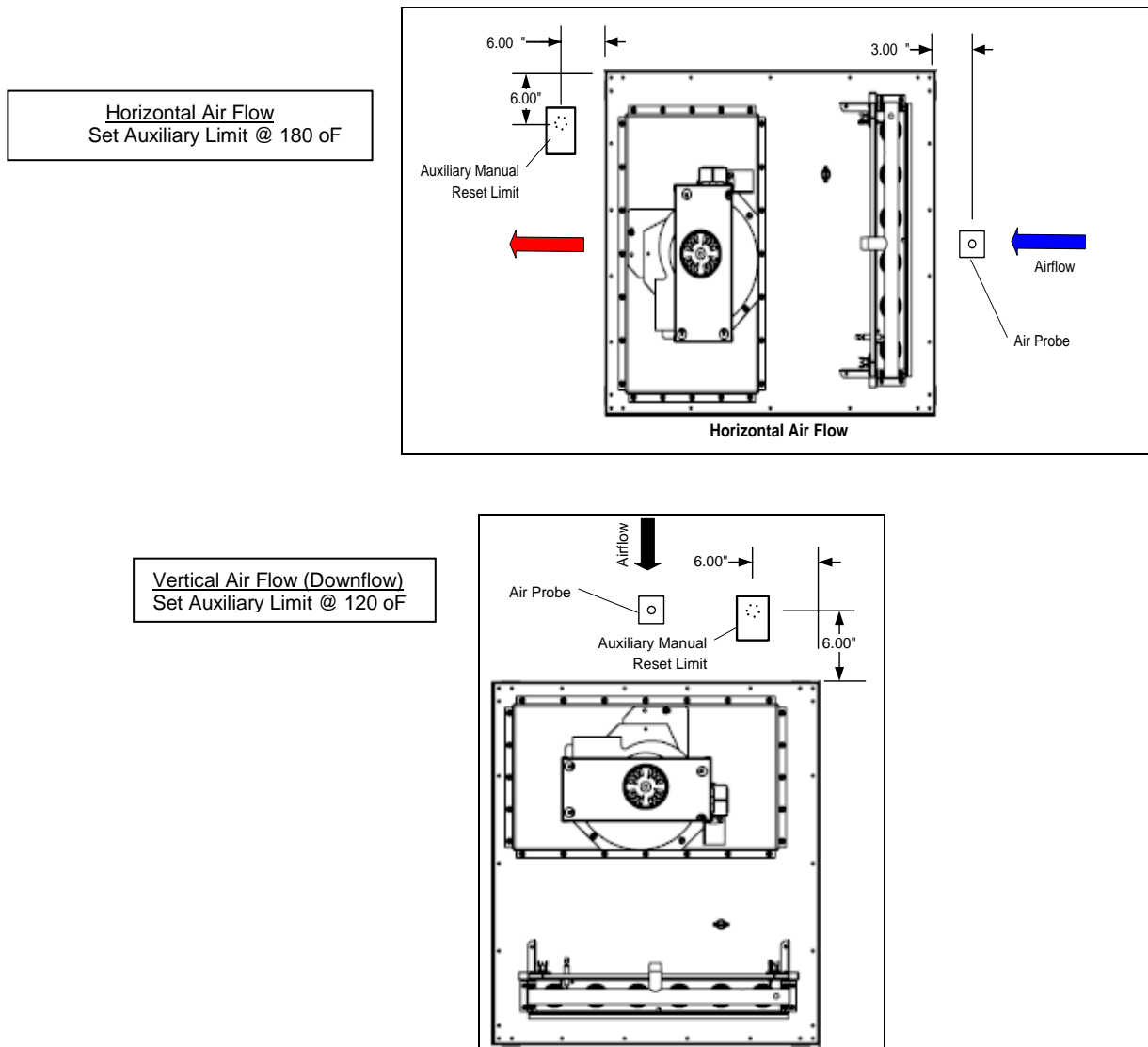
The installation of a circulating airflow proving switch in the cabinet or duct is recommended, to prevent operation of the gas heater in the event of failure of the circulating air fan. This switch should be installed upstream of the heating section to prove operation of the circulating air fan during heater operation (See Fig. 13). This switch shuts off electrical supply to the ignition controller if a positive pressure is not detected by the switch due to lack of air flow through the heat exchanger. An airflow proving switch kit with air probe is available for this heating unit.

CAUTION: The limit switch provided integral to the heating is an automatic reset type as required by the approval standard for this product. On circulating air fan failure, heater will cycle on limit resulting in possible heat build-up and damage to components.

Auxiliary High Limit

In certain airflow configurations including vertical air flow or zoned airflow applications, the installation of a manual reset auxiliary limit is recommended. See Fig. 15 for typical location. In the event of a reverse flow or limited flow conditions, this limit would function to shut-off the gas supply to the heating unit. An auxiliary manual reset limit is available for this heating unit.

Figure 15 – Auxiliary Limit & Airflow Probe – Suggested locations



Optional Controls

Low Gas Pressure Switch

A low gas pressure switch may be factory installed on the inlet side of the gas train to monitor gas pressure upstream of the gas controls. This switch shuts off the electrical supply to the ignition controller, closing the gas valve, if low gas pressure occurs. This pressure switch is factory set for the minimum inlet gas pressure for the heater model.

High Gas Pressure Switch

A high gas pressure switch may be factory installed on the gas train to monitor the gas pressure downstream of the combination gas valve. This switch shuts off the electrical supply to ignition controller, closing the gas valve, if high gas pressure occurs. The pressure switch is factory set so that the maximum manifold pressure does not exceed 4.0 in. W.C. on Natural Gas and 10.5 in. W.C on Propane Gas.

Annual Maintenance

This duct furnace should be inspected and serviced annually by a qualified service agency, to assure proper operation

Furnace Module Inspection

Turn off all electrical power to the unit before inspection and servicing.

1. The condition of the burners, heat exchanger, draft inducer, vent system and operating controls should be determined. Check for obvious signs of corrosion, accumulation of dirt and debris and any heat or water related damage. Any damaged or deteriorated parts should be replaced before the unit is put back into service.
2. Clean burners, heat exchanger, draft inducer and vent ducts as outlined on Page 11.
3. Check Heat Exchanger for cracks. If any are present, replace heat exchanger before putting unit back into service.
4. Check electrical wiring for loose connections or deteriorated insulation.
5. Check the attachment point of the furnace module to the cabinet or ducts to verify that they are air tight.
6. Check for gas tightness of all pipe joints and connections
7. Check the automatic gas valve to insure that the gas valve seat is not leaking.

If duct furnace is located downstream of cooling coils a condensate drain line should be connected to the flue collector box. Be sure that drain line is not obstructed. Clean any debris or blockage from the line.

Furnace Module Operation Check

1. Turn on power to the unit and set thermostat or heat controller to call for heat, allowing furnace module to operate.
2. Check for proper start-up and ignition as outlined in Sequence of operation for the control provided.
3. Check the appearance of the burner flame (See Figure 10A and 10B on Page 11).
4. Return thermostat or heat controller to normal setting.
5. Refer to the appliance manufacturer's instructions for annual maintenance procedures on the complete unit.

CAUTION !

If any of the original wiring needs to be replaced it must be replaced with wiring materials suitable for 105°C.
Label all wires prior to disconnection when servicing unit. Wiring errors can cause improper or dangerous operation. Verify proper operation after servicing.