

OUTDOOR DUCT FURNACE INSTALLATION, OPERATION, AND MAINTENANCE

MODELS RG, RPV, AND RX



⚠ DANGER ⚠

FIRE OR EXPLOSION HAZARD

- Failure to follow safety warnings exactly could result in serious injury, death, or property damage.
- Improper installation, adjustment, alteration, service, or maintenance can cause serious injury, death, or property damage.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.
- Be sure to read and understand the installation, operation, and service instructions in this manual.
- 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.

DO NOT DESTROY. PLEASE READ CAREFULLY. KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

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GENERAL INFORMATION

This unit has been tested for capacity and efficiency so as to provide many years of safe and dependable comfort providing it is properly installed and maintained. With regular maintenance, this unit will operate satisfactorily year after year. Abuse, improper use, and/or improper maintenance can shorten the life of the appliance and create unsafe hazards.

To achieve optimum performance and minimize equipment failure, it is recommended that periodic maintenance be performed on this unit. The ability to properly perform maintenance on this equipment requires certain tools and mechanical skills.

Installation should be done by a qualified agency in accordance with the instructions in this manual and in compliance with all codes and requirements of authorities having jurisdiction.

Important Safety Information

Please read all information in this manual thoroughly and become familiar with the capabilities and use of your appliance before attempting to operate or maintain this unit. Pay attention to all dangers, warnings, cautions, and notes highlighted in this manual. Safety markings should not be ignored and are used frequently throughout to designate a degree or level of seriousness.

DANGER: A danger statement describes a potentially hazardous situation that if not avoided, will result in severe personal injury or death and/or property damage.

WARNING: A warning statement describes a potentially hazardous situation that if not avoided, can result in severe personal injury and/or property damage.

CAUTION: A caution statement describes a potentially hazardous situation that if not avoided, can result in minor or moderate personal injury and/or property damage.

NOTE: A note provides important information that should not be ignored.

DANGER

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operation, and maintenance instructions thoroughly before installing or servicing this equipment.

WARNING

- **Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapors, combustible dust, or chlorinated or halogenated hydrocarbons or in applications with airborne silicone substances.**
- **To ensure safety, follow the lighting instructions located on the outlet box cover.**
- **These duct furnaces are not certified or approved for use in drying or process applications. If a duct furnace is to be used in a drying or process application, contact the factory for application guidelines and manufacturer's authorization. Without factory authorization, the warranty is void, and the manufacturer disclaims any responsibility for the duct furnace and/or the application.**

Warranty

Refer to the limited warranty information on the warranty card in the *owner's envelope*. The warranty is void if:

- a. Furnaces are used in atmospheres containing flammable vapors or atmospheres containing chlorinated or halogenated hydrocarbons or any contaminant (silicone, aluminium oxide, etc.) that adheres to the spark ignition flame sensing probe on furnaces equipped with optional spark pilot.
- b. Wiring is not in accordance with the diagram furnished with the heater.
- c. Unit is installed without proper clearances to combustible materials (refer to [Clearances](#) section) or without proper ventilation and air for combustion (refer to [Combustion Air Requirements](#) section).
- d. Furnace air throughput is not adjusted within the range specified on the rating plate.
- e. Duct furnace is installed in a process or drying application without factory authorization. Any use in a process or drying application voids agency certification.

GENERAL INFORMATION—CONTINUED

Applicability

The instructions in this manual apply to the outdoor duct furnace models listed in [Table 1](#).

Table 1. Model Applicability			
Vent	Model	CFM	Thermal Efficiency
Gravity	RG	Standard	78%
	RX		
	HRG	High	
	HRX		
	CRG	Standard	80%
	CRX		
	HCRG	High	
	HCRX		
Power	RPV	Standard	
	HRP	High	
	HRPV		

Installation Codes

The outdoor duct furnaces covered in this manual are design-certified by the Canadian Standards Association to ANSI 283.8 and CAN/CGA 2.6 for use with either natural or propane gas. The gas type for which the furnace is equipped and the correct firing rate are shown on the rating plate attached to the unit. Electrical characteristics are also shown on the unit rating plate.

These units must be installed in accordance with local building codes. In the United States, the unit must be installed—in the absence of local codes—in accordance with the National Fuel Gas Code (latest edition). A Canadian installation must be in accordance with the CAN/CGA B149.1 and B149.2 Installation Code for Gas Burning Appliances and Equipment. These codes are available from CSA Information Services (1-800-463-6727). Local authorities having jurisdiction should be consulted before installation is made to verify local codes and installation procedure requirements.

Clearances

Clearance (refer to [Table 2](#)) to combustibles is defined as the minimum distance from the heater to a surface or object so as to ensure that a surface temperature of 90°F above the surrounding ambient temperature is not exceeded. Clearance is also required at the sides of the furnace for safety, for combustion air, and for servicing the unit.

Table 2. Clearances					
Model Series	Unit Surface				
	Top	Side		Bottom	
		Control*	Non-Control	To Combustibles	To Non-Combustibles
	Required Clearance (Inches (mm))				
RG	36 (914)	6 (152)		0 (0)	
RX and RPV				3 (76)	0 (0)
RG and RX	30-foot (9-meter) radius from center of vent cap to obstruction such as wall, parapet, or cupola				
*Clearance listed plus width of furnace.					

*Clearance listed plus width of furnace.

Dimensions

NOTES:

- Dimensions for model series RG are shown in [Figure 1](#) and listed in [Table 3](#).
- Dimensions for model series RPV are shown in [Figure 2](#) and listed in [Table 4](#).
- Dimensions for model series RX are shown in [Figure 3](#) and listed in [Table 5](#).



GENERAL INFORMATION—CONTINUED

Dimensions—Continued

Table 3. Dimensions for Model Series RG										
Model	Unit Size	Alphabetic Designation (See Figure 1)								
		A	B	C	D	E	F	G	H	
		Dimension (inches ±1/8 (mm ±3))								
(H)-RG,CRG	75	33-7/16 (849)	28-1/2 (724)	12-1/2 (318)	20-5/16 (516)	6 (152)	2 (51)	1-21/32 (42)	3-3/32 (79)	9 (229)
	100			15-1/4 (387)		8 (203)			11-1/2 (292)	
	125									
	150, 175	38-15/16 (989)	34 (864)	20-3/4 (527)	25-13/16 (656)	10 (254)	3 (76)		15 (381)	
	200, 225	44-7/16 (1129)	39-1/2 (1003)	26-1/4 (667)	31-5/16 (795)					
	250	52-11/16 (1338)	47-3/4 (1213)	34-1/2 (876)	39-9/16 (1005)	12 (305)	12 (305)		29 (737)	
(H)-RG	10 (254)					3 (76)	15 (381)			
(H)-CRG										
(H)-RG,CRG	350					58-3/16 (1351)	53-1/4 (1353)		40 (1016)	45-1/16 (1145)
	400	63-11/16 (1618)	58-3/4 (1492)	45-1/2 (1156)	50-9/16 (1284)					

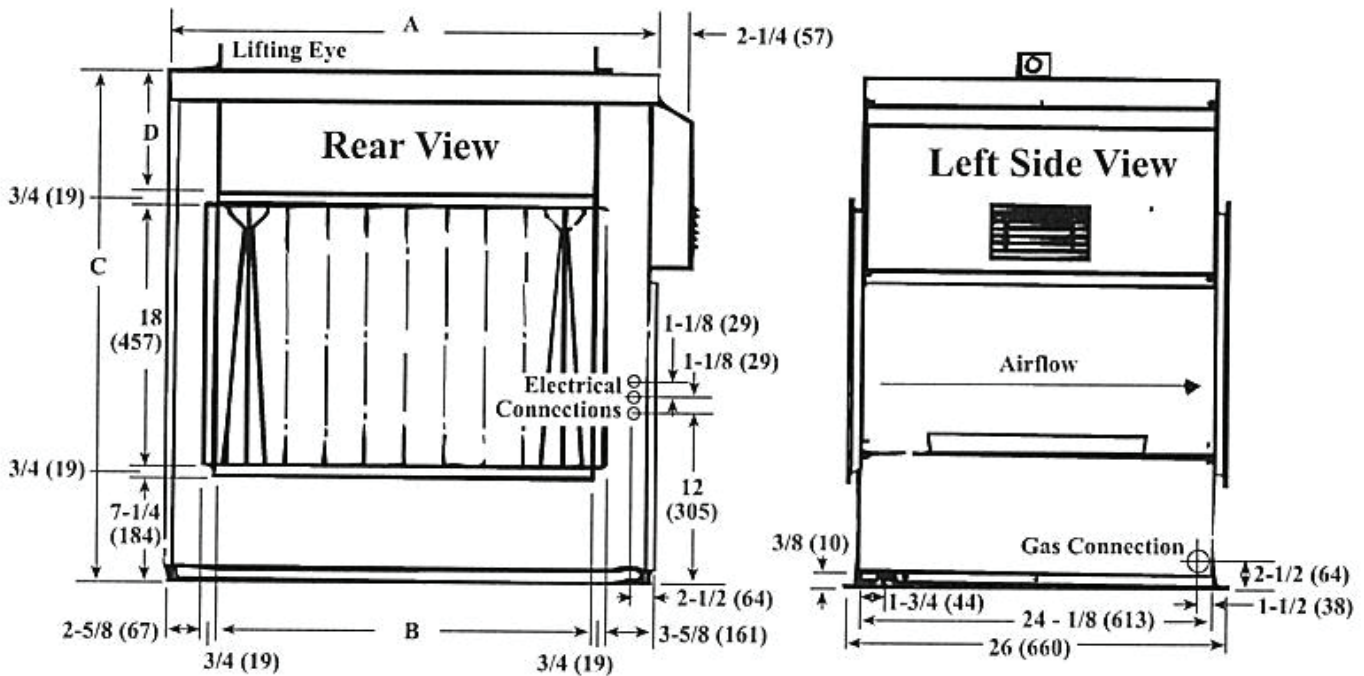


Figure 2. Model RPV Series Dimensions (Refer to Table 4)

Table 4. Dimensions for Model Series RPV					
Model	Unit Size	Alphabetic Designation (See Figure 2)			
		A	B	C	D
		Dimension (inches ±1/8 (mm ±3))			
(H)-RPV	125	23 (584)	15-1/4 (387)	32-1/4 (819)	5-1/2 (140)
	150, 175	28-1/2 (724)	20-3/4 (527)		
	200, 225	34 (864)	26-1/4 (667)		
	250	42-1/4 (1073)	34-1/2 (876)	35-1/4 (895)	8-1/2 (216)
	300				
	350	47-3/4 (1213)	40 (1016)		
	400	53-1/4 (1353)	45-1/2 (1156)		

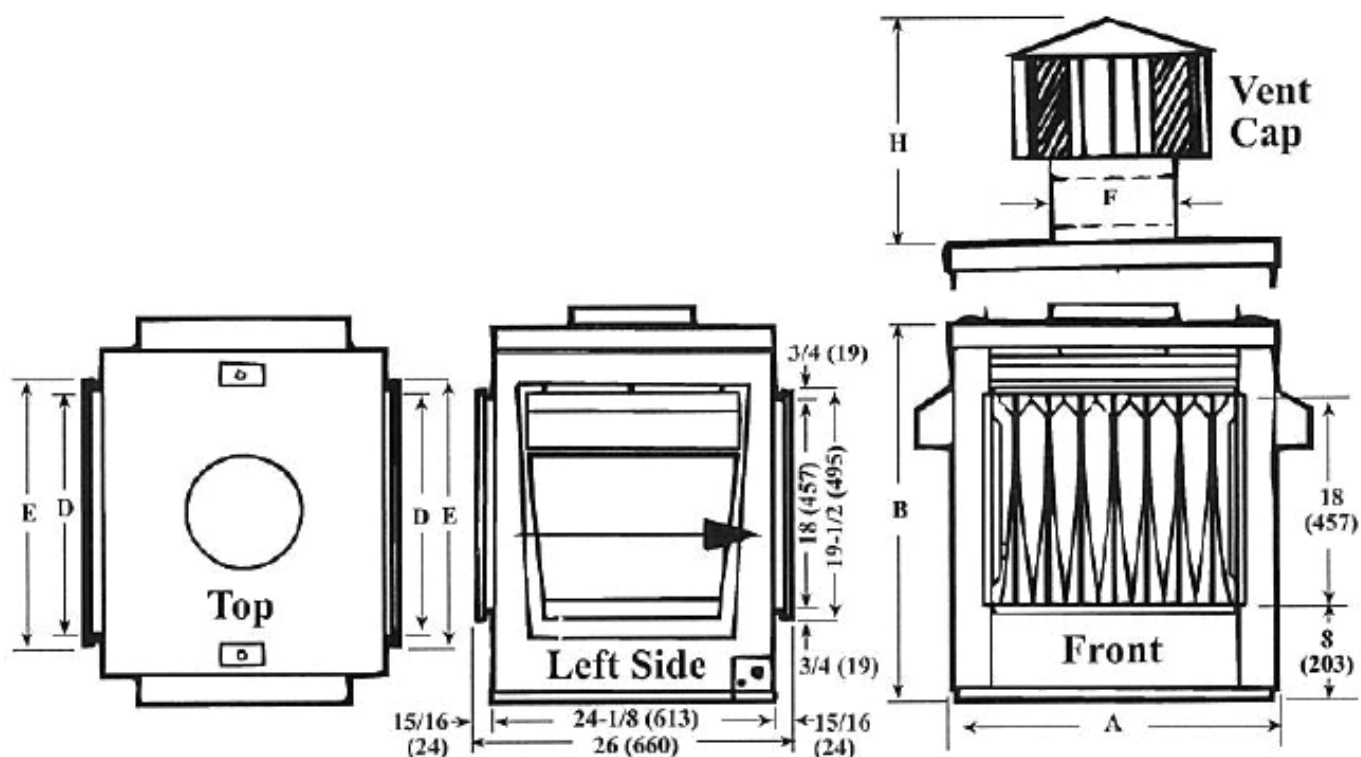


Figure 3. Model RX Series Dimensions (Refer to [Table 5](#))

Table 5. Dimensions for Model Series RX							
Model	Unit Size	Alphabetic Designation (See Figure 3)					
		A	B	D	E	F	H
		Dimension (inches ±1/8 (mm ±3))					
(H)-RX,CRX	75	19-1/4 (489)	32-1/4 (819)	12-1/2 (318)	14 (356)	6 (152)	9 (229)
	100			15-1/4 (387)	16-3/4 (425)		11-1/2 (292)
	125			22 (559)	20-3/4 (527)	22-1/4 (565)	
	150, 175	27-1/2 (699)	35-1/4 (895)	26-1/4 (667)	27-3/4 (705)	10 (254)	15 (381)
	200, 225	33 (738)		34-1/2 (876)	36 (914)	12 (305)	29 (737)
	250	41-1/4 (1048)				10 (254)	15 (381)
(H)-RX	300			40 (1016)	41-1/2 (1054)	12 (305)	29 (737)
(H)-CRX							
(H)-RX,CRX	350	46-3/4 (1187)	45-1/2 (1156)	47 (1194)	12 (305)	29 (737)	
	400	52-1/4 (1327)					

Weights

Table 6. Weights										
Model Series	Unit Size									
	75, 100	125	150	175	200	225	250	300	350	400
	Approximate Net Weights (lb (kg))									
RG	160 (73)	196 (89)	212 (96)		242 (110)		290 (132)		327 (148)	354 (161)
RX	161 (73)	167 (76)	181 (82)		247 (112)		305 (138)	308 (140)	337 (153)	364 (165)
RPV	—	193 (88)	203 (92)	207 (94)	271 (123)	278 (126)	339 (154)	349 (158)	368 (167)	405 (184)

GENERAL INFORMATION—CONTINUED

Gas Connections

Table 7. Gas Connections						
RG Series Model	RX Series Model	RPV Series Model	Unit Size	Gas Type		
				Natural	Propane	
				Connection Size (Inches)		
(H)-RG,CRG	(H)-RX,CRX	—	75	1/2		
			100			
		(H)-RPV	125			
			150, 175			
			200, 225			
			250			
300	3/4		1/2			
300						
350						
400						
(H)-RG	(H)-RX	(H)-RPV	300	3/4	1/2	
(H)-CRG	(H)-CRX		300			
(H)-RG,CRG	(H)-RX,CRX		350			
			400			

INSTALLATION

Uncrating

This furnace was test operated and inspected at the factory prior to crating and was in operating condition. If the furnace has incurred any damage in shipment, document the damage with the transporting agency and immediately contact your Reznor distributor.

Pre-Installation Checklist

- ☐ Check the rating plate for the gas specifications and electrical characteristics of the furnace to ensure that they are compatible with the gas and electric supplies at the installation site.
- ☐ Read this booklet and become familiar with the installation requirements of your particular furnace. If you do not have knowledge of local requirements, check with the local gas company or any other local agencies who might have requirements concerning this installation.
- ☐ Make preparations for the necessary supplies, tools, and manpower.
- ☐ Check to see if there are any field-installed options that need to be assembled to the furnace prior to installation.
- ☐ Some gas control options will have parts either shipped loose with the heater or shipped separately. If your unit is equipped with any of the gas control options listed in [Table 8](#), ensure that these parts are available at the job site. Other shipped-separate options could include a gas shutoff valve, a vertical vent terminal, a thermostat, a different control switch, or a disconnect switch.

Table 8. Gas Control Option Components		
Component	Gas Control Option	PN
Thermostat	AG7*	48033
Control switch	AG3, AG6, AG8, AG9, AG13, AG15, AG16**	29054
Remote temperature selector	AG9**	48042
	AG15, AG16**	115848
	AG39**	174849
Stage adder module	AG15, AG16**	115849
Remote display module	AG16**	115852
*Gas control option for heating.		
**Gas control options for makeup air.		

Reversing Airflow by Changing Direction of Heat Exchanger Air Baffles

NOTE: Models with prefix *H* are factory-built for high CFM capability and include only the top baffle support shown in [Figure 4](#). To reverse airflow, move the top baffle support. The top baffle support must always be on the entering air side of the unit.

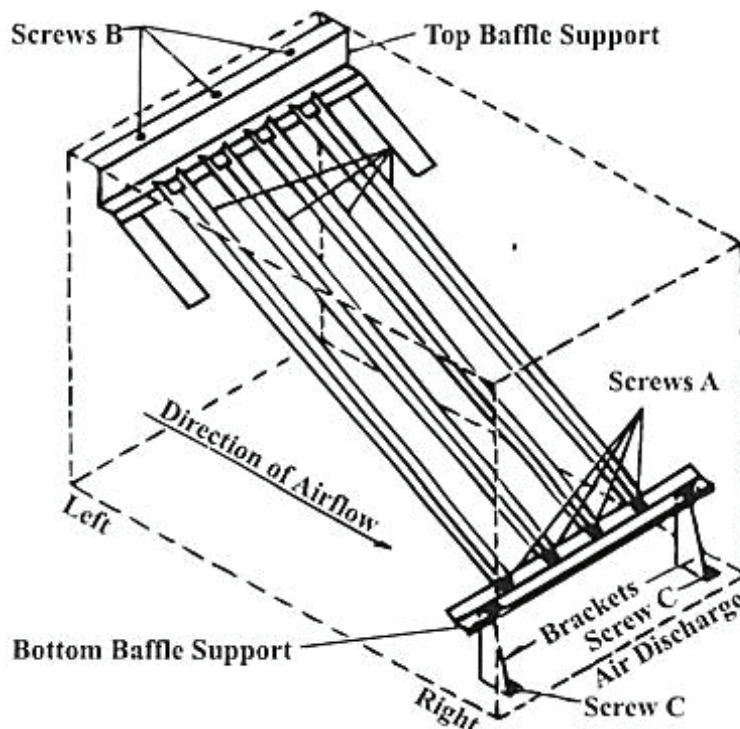


Figure 4. Heat Exchanger Air Baffles

Duct furnaces are equipped with directional air baffles between the heat exchanger tubes. When facing the control compartment of the furnace, the standard direction of airflow is from left to right. Installations requiring direction of airflow from right to left when facing the control compartment will require repositioning the directional air baffles at the installation site. Change the position of the baffles as follows:

1. Remove A screws (see [Figure 4](#)) and lift each baffle slightly and slide forward, removing each baffle from heat exchanger.
2. Remove C screws (see [Figure 4](#)) and remove bottom baffle support and brackets from heat exchanger.
3. Remove B screws (see [Figure 4](#)) and remove top baffle support. Install top baffle support on opposite end of heat exchanger using B screws.
4. Re-install bottom baffle support and brackets on opposite end of heat exchanger using C screws.
5. Re-install each baffle using A screws.

Combustion Air Requirements

The combustion air and flue gas openings are carefully designed screened openings located on the side of the unit, just above the control access panel. Location of the flue opening directly above the air intakes discourages the recirculation or combustion products.

Combustion Air: Power-Vented Model Series RPV

[Figure 5](#) shows the combustion air intakes on a power-vented model series RPV unit.

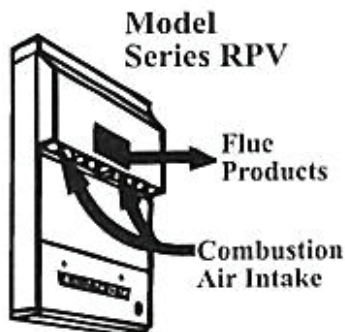


Figure 5. Combustion Air Intakes on Power-Vented Models

INSTALLATION—CONTINUED

Combustion Air Requirements—Continued

Combustion Air: Gravity-Vented Model Series RX and RG

Both model RX and RG series furnaces have screened combustion air intake hoods in their doors. The intake hood on a model RG furnace is factory-installed. The intake hood on a model RX furnace requires field installation as follows:

1. If intake hood parts have been shipped attached to inside of one or both furnace access doors remove them and assemble intake hood before heater is installed.

NOTE: The parts shown in [Figure 6](#) may be shipped attached to the inside of one or both furnace access doors to facilitate crating. They must be removed from the inside of the doors and installed on the outside as shown. The intake hood is comprised of the parts shown in [Figure 6](#): inlet hood (A), screen retainer or shield (B), and screen (C). On unit sizes 75, 100, and 125, the screen retainer serves as a shield and no screen is used. Unit sizes 150 through 400 use the screen retainer *and* screen.

2. Attach screen retainer or shield (B) (see [Figure 6](#)) using sheet metal screws (heads out).
3. Attach inlet hood (A) (see [Figure 6](#)) at top only using sheet metal screws (don't tighten).
4. Insert screen (C) (see [Figure 6](#)) under retainer (B) and over bottom flange of inlet hood (A) and attach hood at sides using sheet metal screws. Tighten top sheet metal screws.

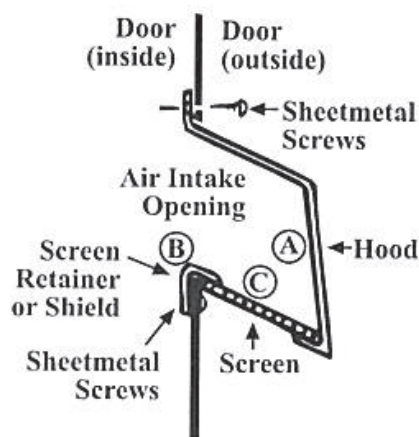


Figure 6. Intake Hood Assembly

Chlorine Vapor: All Models

The presence of chlorine vapor in the combustion air of gas-fired heating equipment presents a potential corrosion hazard. Chlorine will, when exposed to flame, precipitate from the compound—usually Freon or degreaser vapors—and go into solution with any condensation that is present in the heat exchanger or associated parts. The result is hydrochloric acid, which readily attacks all metals including 300 grade stainless steel.

NOTE: Care should be taken to separate chlorine vapor from the combustion process. This may be done by the wise location of the furnace with regard to exhausters or prevailing wind direction. Remember, chlorine is heavier than air. This fact should be kept in mind when determining installation locations of heating equipment and building exhaust systems.

Rigging and Mounting Furnace

⚠ DANGER ⚠

To prevent injury, death, or equipment damage, ensure that lifting device and rigging is adequate for the weight (refer to [Table 6](#)) of the unit. Before installing the furnace, check the supporting structure to be used to verify that it has sufficient load-carrying capacity to support the weight of the unit.

Lifting holes are provided at each of the four corners of the mounting support rails. Use spreader bars when lifting to prevent chains or cables from damaging the cabinet. RG series models may be placed directly on a slab or roof where support is adequate. Support rails provide required clearance from combustibles. RX and RPV series models require a 3-inch (76-mm) minimum clearance from the bottom of the unit to a combustible surface. Available support feet (PN 10680, four (4) required, see DETAIL A, [Figure 7](#)) or 3-inch (76-mm) field-fabricated supports (see DETAIL B, [Figure 7](#)) will provide adequate clearance.

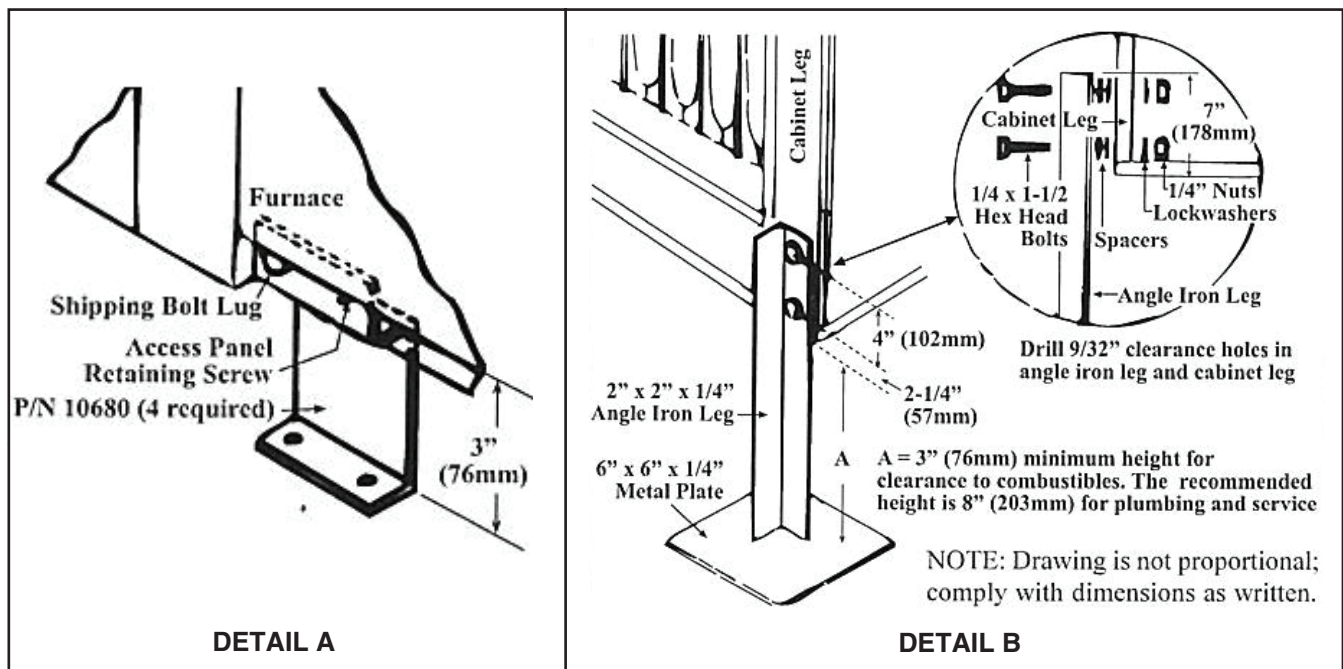


Figure 7. Clearance Supports for RX and RPV Series Models

Venting

Gravity-Vented Outdoor Models (H)-RX,CRX,RG,CRG

⚠ WARNING ⚠

Model series RX and RG gravity-vented furnaces should be located on a roof or slab with at least a 30-foot (9-meter) radius between the center of the vent cap and obstructions such as walls, parapets, or cupolas.

NOTE: The appropriate size (refer to [Table 9](#)) of gravity vent cap is supplied with the furnace.

Table 9. Vent Cap Data					
Model	All			(H)-CRX,CRG	(H)-RX,RG
Unit Size	75, 100	125, 150, 175	200, 225, 250	300	350, 400
Size (inches (mm))	6 (152)	8 (203)	10 (254)		12 (305)
Extension required	No			Yes (packed inside cap)	

INSTALLATION—CONTINUED

Venting—Continued

Gravity-Vented Outdoor Models (H)-RX,CRX,RG,CRG—Continued

The gravity vent cap requires field installation. For furnaces that **do not require** vent cap extension (unit sizes 75–250 and high-efficiency size 300), align holes and attach vent cap to furnace flue collar using sheet metal screws. For furnaces that **do require** vent cap extension (standard-efficiency unit size 300 and all sizes 350 and 400), a 12-inch extension is necessary to raise the vent cap above the top of the furnace. Install this extension as follows:

NOTE: IMPORTANT REQUIREMENT: For proper operation of the gravity vent cap, position the pre-punched holes (see DETAIL B, Figure 8) so that the solid side panel of the cap faces the control compartment access panel side of the furnace.

1. Remove extension (PN 20524, see DETAIL A, Figure 8) from inside of vent cap (extension is packed inside cap).
2. Attach extension to furnace flue collar as follows:
 - a. Position 3/8-inch center line clearance holes at bottom and wrap extension **around** flue collar on top of furnace.
 - b. Align holes in extension with holes in flue collar.
 - c. Secure extension using #10-1/2 sheet metal screws.
3. Attach vent cap (see DETAIL B, Figure 8) to extension as follows:
 - a. Position vent cap **into** top of extension.
 - b. Align holes and push cap into extension.
 - c. Secure vent cap using #10-1/2 sheet metal screws.

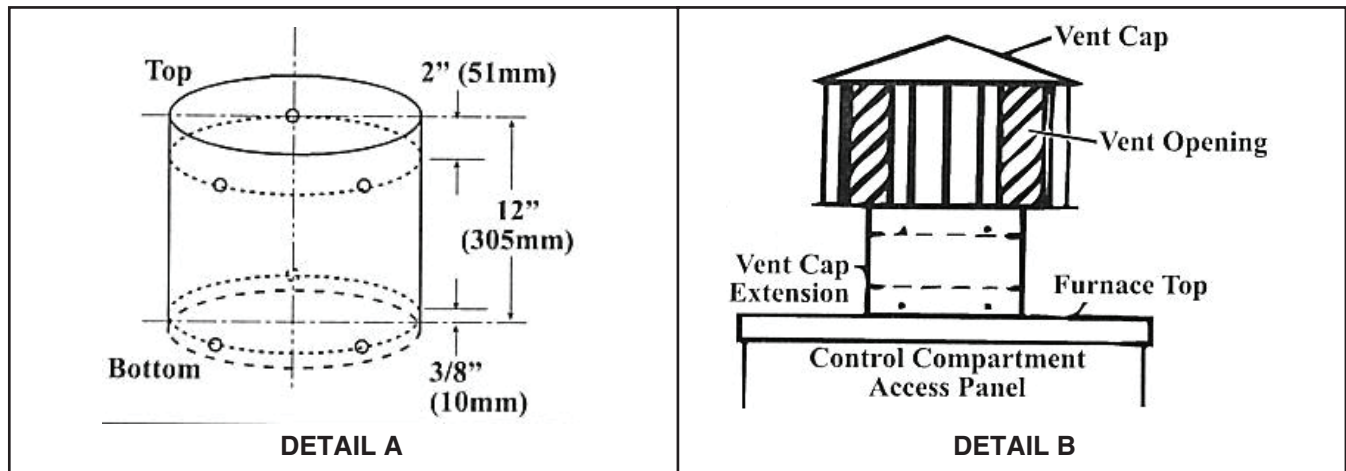


Figure 8. Vent Cap Extension and Vent Cap

Optional Flue Extension for Gravity Vent (Model Series RX or RG with Option ZZ)

- Outdoor, gravity-vented furnaces that are factory-built with option ZZ are designed to release flue gases 4 feet above the top of the furnace. A field-provided 4-foot (1.2-meter) vent extension must be installed between the top of the furnace and the bottom of the vent cap.
- Furnaces with option ZZ (factory-installed restrictor plus field-provided 4-foot stack) may be installed adjacent to fresh air inlet(s) when local code requires that release of flue gases be above an adjacent fresh air inlet that is not part of the furnace.
- The optional flue extension applies only to furnaces with the suffix **Z** in the model number (e.g., RX-400-6Z).
- To secure the flue extension, three guy wires, spaced 120-degrees apart, must be fastened between the extension and the furnace top using sheet metal screws as shown in Figure 9,

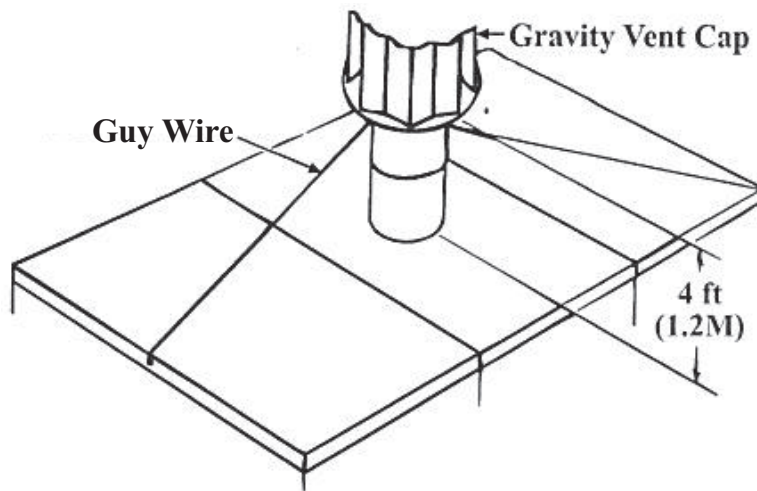


Figure 9. Flue Extension Guy Wires

Power-Vented Outdoor Models (Model Series RPV)

- For power-vented outdoor models, locate the furnace so that flue discharge is not directed at fresh air inlets.
- Power-vented outdoor models have screened flue gas exhaust and combustion air intake openings located on the side of the furnace just above the control access panel as shown in [Figure 5](#). These openings are designed to discourage the recirculation of combustion products and to provide for furnace operation in all normal weather conditions.
- Optional vertical vent piping provides compliance with local codes that require either 10-foot horizontal or 4-foot vertical clearance between the flue outlet and the fresh air intake of the heating system and/or building.
- Power-vented furnaces with the optional vertical flue discharge (option CC3) are certified with 4 feet of vertical pipe attached as shown in [Figure 10](#). The distance is measured from the top of the unit to the bottom of the vent cap.

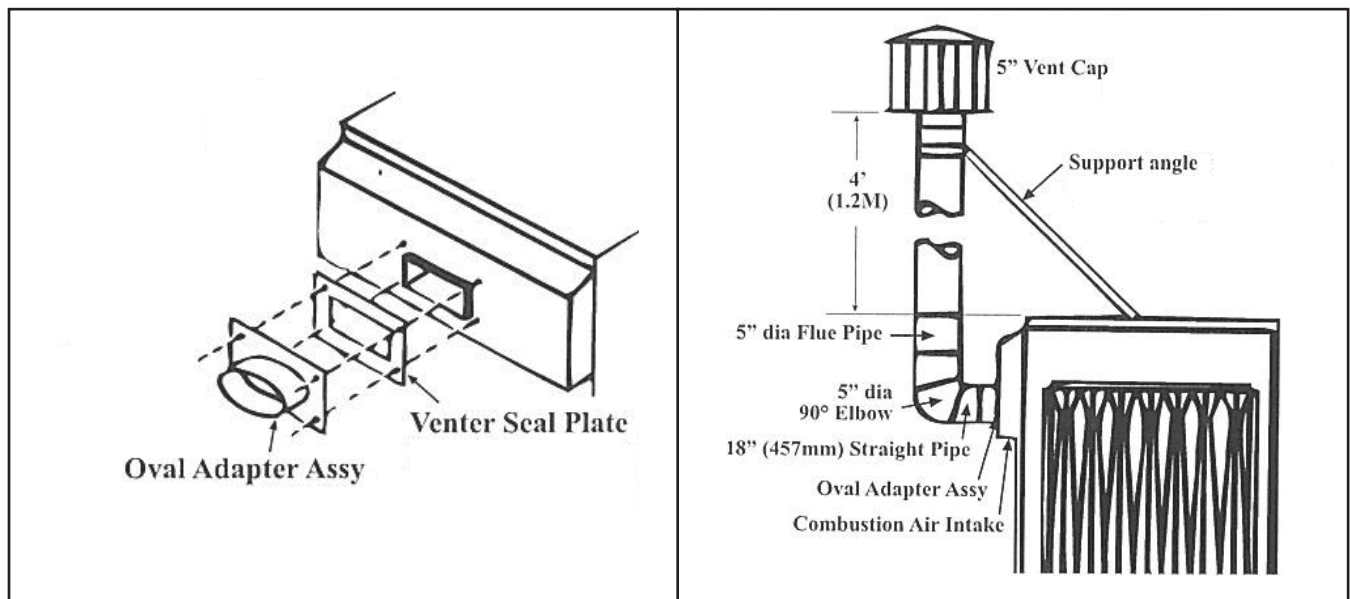


Figure 10. Optional Vertical Flue Discharge (Option CC3)

INSTALLATION—CONTINUED

Venting—Continued

Power-Vented Outdoor Models (Model Series RPV)—Continued

- The option CC3 package (PN 45021) includes the 5-inch vent cap (PN 110052), the adapter assembly (PN 103025), and the venter seal plate (PN 43446). The 5-inch vent piping and support angles (recommended 1/2-inch × 1/2-inch, 20 gauge) are field-supplied. Install the option package as follows (see [Figure 10](#)):
 - a. Use venter seal plate as drill template.
 - b. Attach venter seal plate and oval adapter assembly using sheet metal screws.
 - c. Connect flue piping and support it with angles as shown in [Figure 10](#).

Condensate Drain

No installation is required for the condensate drain. All furnace bottom panels are provided with holes to eliminate condensation as follows:

- Model series RX: slots in all four corners
- Model series RPV: a 9/16-inch diameter hole in the corner
- Model series RG: holes in all four corners

Duct Connections

Requirements and suggestions for connecting and installing ducts are as follows:

- **Type of ductwork:** The type of duct installation to be used depends in part on the type of construction of the roof (wood joist, steel bar joist, steel truss, pre-cast concrete) and the ceiling (hung, flush, etc.).
- **Ductwork material:** Rectangular duct should be constructed of not lighter than #26 US gauge galvanized iron or #24 B&S gauge aluminum.
- **Ductwork structure:** All duct sections 24 inches (610 mm) or wider and over 48 inches (1219 mm) in length should be cross-braken on top and bottom and should have standing seams or angle iron braces. Joints should be S and drive-strip or locked.
- **Through masonry walls:** No warm air duct should come in contact with masonry walls. Insulate around all air duct through masonry walls with not less than 1/2 inch (1 inch is recommended) of insulation.
- **Through unheated space:** Insulate all exposed warm air ducts passing through an unheated space with at least 1/2 inch (1 inch is recommended) of insulation.
- **Duct supports:** Suspend all ducts securely from building members. Do not support ducts from unit duct connections.
- **Duct sizing:** Proper sizing of the supply air ductwork is necessary to ensure a satisfactory heating installation. The recognized authority for such information is the Air Conditioning Contractors Association, 1228 17th Street NW, Washington, D.C. 20036. A manual that covers duct sizing in detail may be purchased directly from them.

⚠ CAUTION ⚠

Joints where supply air ducts connect to the furnace must be sealed securely to prevent air leakage into draft hood or burner rack area. Leakage can cause poor combustion and/or pilot problems, and can shorten heat exchanger life and cause poor performance.

- **Removable panels:** The ducts should have removable access panels on both upstream and downstream sides of the furnace. These openings must be accessible when the furnace is in service and should be a minimum of 6 × 10 inches in size so smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heat exchanger. The covers for the openings must be attached so as to prevent leakage as follows (see [Figure 11](#)):
 - a. Locate flanges (1) on furnace (heat exchanger) that turn out.
 - b. Shape duct connection (2) as shown with U-channel on top and bottom and L-channel on sides.
 - c. Slide U-channels over furnace top and bottom flanges (3) making connection.
 - d. Form U-channels to seal sides (4). Drill and lock with sheet metal screws.

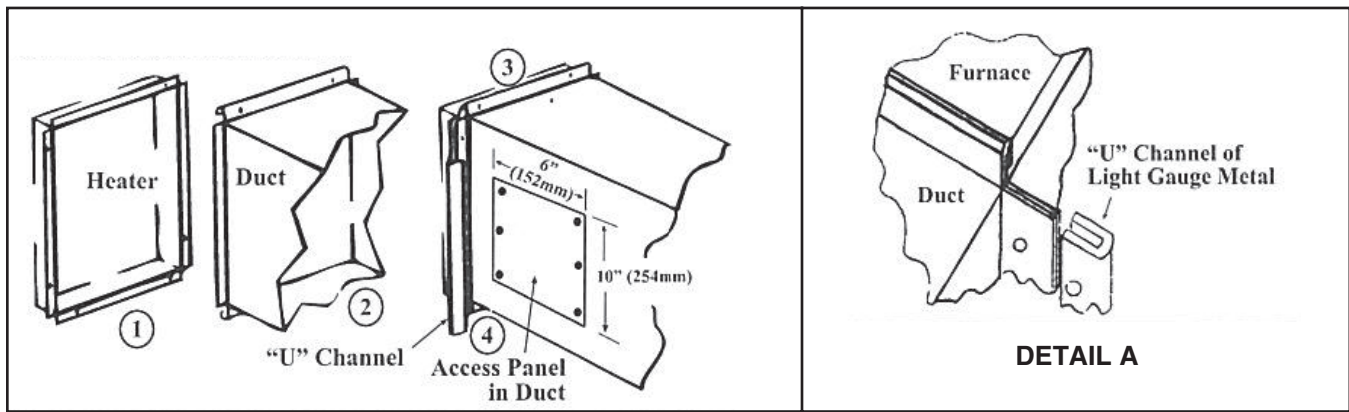
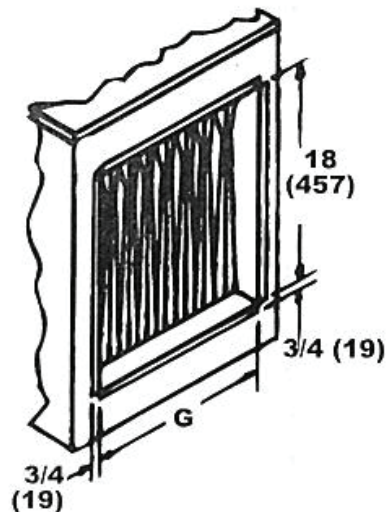


Figure 11. Duct Connections

- **Supply air duct/furnace horizontal connection:** The seal between the furnace and the duct must be mechanical. Duct connection should be made with U-type flanges on the top and bottom of the connecting duct. Slide the duct over the flanges of the heater giving an airtight fit. Provide U-channels (see DETAIL A, [Figure 11](#)) for the flanges on the other side to ensure tight joints. Use sheet metal screws to fasten ducts and U-channels to the furnace flange.
- **Horizontal discharge duct length:** A minimum horizontal duct run of 24 inches (610 mm) is recommended to reduce losses at the furnace outlet before turns or branches are made in the duct system. Duct connection dimensions for horizontal discharge are shown in [Figure 12](#) and listed in [Table 10](#).



NOTE: Dimensions shown in inches (mm).

Figure 12. Horizontal Discharge Duct Connection Dimensions

Table 10. Horizontal Discharge Duct Connection Dimensions	
Unit Size	Dimension G (See Figure 12) in Inches (mm)
75, 100	12-1/2 (318)
125	15-1/4 (387)
150, 175	20-3/4 (527)
200, 225	26-1/4 (667)
250, 300	34-1/2 (876)
350	40 (1016)
400	45-1/2 (1156)

INSTALLATION—CONTINUED

Duct Furnace Airflow Requirements

The duct furnace must be installed on the positive pressure side of the field-supplied blower. Air throughput must be within the CFM range stated on the heater rating plate. The air distribution must be even over the entire heat exchanger. To determine temperature rise, the inlet and outlet air temperatures should be measured at points not affected by heat radiating from the heat exchanger. Refer to the [Temperature Rise, CFM, and Pressure Drop](#) section for the approved temperature rise range with the required CFM and the internal pressure drop for each size of unit. Refer to the [Duct Furnace Blower Connections](#) section for suggested blower connections that include turning vanes used in elbows or turns in the air inlet to ensure proper air distribution. If it is determined that the blower CFM is greater than that which is allowed or desirable, refer to the [Bypass Duct Sizing](#) section for instructions on determining the correct size of bypass duct required.

Temperature Rise, CFM, and Pressure Drop

Table 11. Temperature Rise, CFM, and Pressure Drop																						
Temp Rise	Unit Size																					
	75		100		125		150		175		200		225		250		300		350		400	
	CFM	PD*	CFM	PD*	CFM	PD*	CFM	PD*	CFM	PD*	CFM	PD*	CFM	PD*	CFM	PD*	CFM	PD*	CFM	PD*	CFM	PD*
Model Series RPV (80% Thermal Efficient)																						
50°F	—				1840	0.50	2210	0.38	2580	0.52	2945	0.42	3315	0.53	3685	0.40	4420	0.58	5160	0.65	5895	0.67
60°F					1535	0.33	1840	0.26	2150	0.35	2455	0.28	2765	0.36	3070	0.28	3685	0.39	4300	0.44	4915	0.45
70°F					1315	0.25	1580	0.19	1840	0.26	2105	0.22	2370	0.27	2630	0.23	3160	0.29	3685	0.31	4210	0.3
80°F					1150	0.21	1380	0.15	1610	0.19	1840	0.17	2070	0.22	2300	0.22	2765	0.25	3225	0.25	3685	0.25
90°F					1020	0.18	1225	0.12	1430	0.16	1635	0.14	1840	0.17	2045	0.21	2455	0.22	2865	0.23	3275	0.19
Models HRP and HRPV (80% Thermal Efficient, High CFM)																						
20°F	—				4605	1.16	5530	0.85	6450	1.19	7370	1.00	8295	1.28	9215	0.90	11,060	1.26	12,900	1.23	14,745	1.23
30°F					3070	0.53	3685	0.39	4300	0.54	4915	0.45	5530	0.58	6140	0.41	7370	0.57	8600	0.56	9830	0.56
40°F					2300	0.28	2765	0.21	3225	0.29	3685	0.25	4145	0.31	4605	0.22	5530	0.32	6450	0.31	7370	0.31
50°F					1840	0.21	2210	0.15	2580	0.18	2945	0.16	3315	0.21	3685	0.15	4420	0.21	5160	0.19	5895	0.19
60°F					1535	0.15	1840	0.12	2150	0.15	2455	0.12	2765	0.15	3070	0.11	3685	0.15	4300	0.14	4915	0.15
75°F					1225	0.12	1475	0.11	1720	0.12	1965	0.11	2210	0.12	2455	0.08	2945	0.11	3440	0.11	3930	0.11
Models Series RG and RX (78% Thermal Efficient)																						
50°F	1075	0.22	1435	0.41	1795	0.47	2155	0.36	2515	0.49	2875	0.4	3235	0.50	3590	0.38	4310	0.55	5030	0.62	5750	0.64
60°F	895	0.14	1195	0.28	1495	0.32	1495	0.25	2095	0.33	2395	0.27	2695	0.34	2995	0.27	3590	0.37	4190	0.42	4790	0.43
70°F	770	0.09	1025	0.19	1280	0.24	1540	0.18	1795	0.25	2050	0.22	2310	0.26	2565	0.22	3080	0.28	3590	0.3	4105	0.31
80°F	670	0.06	895	0.14	1120	0.19	1345	0.14	1570	0.18	1795	0.16	2020	0.21	2245	0.21	2695	0.24	3145	0.24	3590	0.24
90°F	595	0.04	795	0.10	995	0.17	1195	0.11	1395	0.15	1595	0.13	1795	0.16	1995	0.19	2395	0.21	2795	0.22	3195	0.18
Models HRG and HRX (78% Thermal Efficient, High CFM)**																						
20°F	2695	0.58	3590	1.03	4490	1.10	5390	0.81	6290	1.13	7185	0.95	8085	1.22	8985	0.85	10,780	1.20	12,580	1.17	14,375	1.17
30°F	1795	0.27	2395	0.47	2995	0.50	3590	0.37	4190	0.51	4790	0.43	5390	0.55	5990	0.39	7185	0.54	8385	0.53	9585	0.53
40°F	1345	0.15	1795	0.27	2245	0.27	2695	0.19	3145	0.28	3590	0.24	4040	0.30	4490	0.21	5390	0.31	6290	0.30	7185	0.30
50°F	1075	0.11	1435	0.15	1795	0.19	2155	0.14	2515	0.17	2875	0.15	3235	0.19	3590	0.14	4310	0.19	5030	0.18	5750	0.18
60°F	895	0.09	1195	0.13	1495	0.14	1795	0.11	2095	0.14	2395	0.11	2695	0.14	2995	0.10	3590	0.14	4190	0.13	4790	0.14
75°F	715	0.09	955	0.11	1195	0.11	1435	0.10	1675	0.11	1915	0.10	2155	0.11	2395	0.07	2875	0.10	3355	0.10	3830	0.10
Model CRG and CRX (80% Thermal Efficient)																						
50°F	1110	0.24	1330	0.34	1655	0.39	—		2220	0.38	—		2960	0.41	3330	0.32	4000	0.47	4665	0.51	5330	0.53
60°F	920	0.15	1105	0.23	1375	0.26			1845	0.26			2460	0.28	2765	0.24	3320	0.32	3875	0.35	4430	0.36
70°F	752	0.10	945	0.16	1175	0.22			1575	0.19			2105	0.22	2365	0.20	2840	0.25	3315	0.26	3785	0.26
80°F	695	0.08	835	0.12	1040	0.18			1395	0.15			1860	0.17	2090	0.20	2510	0.22	2930	0.22	3345	0.21
85°F	650	0.08	780	0.12	975	0.17			1305	0.15			1740	0.16	1960	0.20	2350	0.21	2745	0.20	3135	0.18
Models (H)-CRG and (H)-CRX (80% Thermal Efficient, High CFM)																						
20°F	2775	0.60	3330	0.89	4145	0.92	—		5555	0.84	—		7405	1.03	8330	0.74	10,000	1.00	11,665	1.03	13,330	1.03
30°F	1875	0.28	2250	0.40	2800	0.41			3750	0.37			5000	0.45	5625	0.33	6750	0.47	7875	0.45	9000	0.45
40°F	1395	0.16	1670	0.22	2080	0.23			2790	0.21			3720	0.24	4185	0.19	5020	0.27	5860	0.26	6695	0.26
50°F	1110	0.13	1330	0.15	1655	0.16			2220	0.15			2960	0.16	3330	0.13	4000	0.17	4665	0.16	5330	0.17
60°F	920	0.11	1105	0.13	1375	0.13			1845	0.13			2460	0.13	2765	0.10	3320	0.13	3875	0.11	4430	0.13
70°F	790	0.10	950	0.11	1185	0.11			1585	0.11			2115	0.10	2380	0.08	2855	0.10	3330	0.10	3805	0.09
*PD = internal pressure drop (IN WC).																						
**Temperature rise for models approved to Canadian standards is 20°F–50°F.																						

*PD = internal pressure drop (IN WC).

**Temperature rise for models approved to Canadian standards is 20°F–50°F.

⚠ WARNING ⚠

The furnace must be installed on the positive pressure side of the air-circulating blower.

Blower connection requirements are as follows:

- Proper arrangements of the blower and the duct furnace with respect to the angle of approach of the duct connection and the arrangement of the discharge opening of the blower are shown in [Figure 13](#).
- Blowers should be bottom horizontal discharge when coupled to the duct furnace.
- When a top horizontal discharge blower is connected to the duct furnace, ensure that the duct is of sufficient length to permit the even flow of air at the end of the duct. Alternatively, baffles may be inserted between the blower and the heater to assure an even flow of air across the heat exchanger.

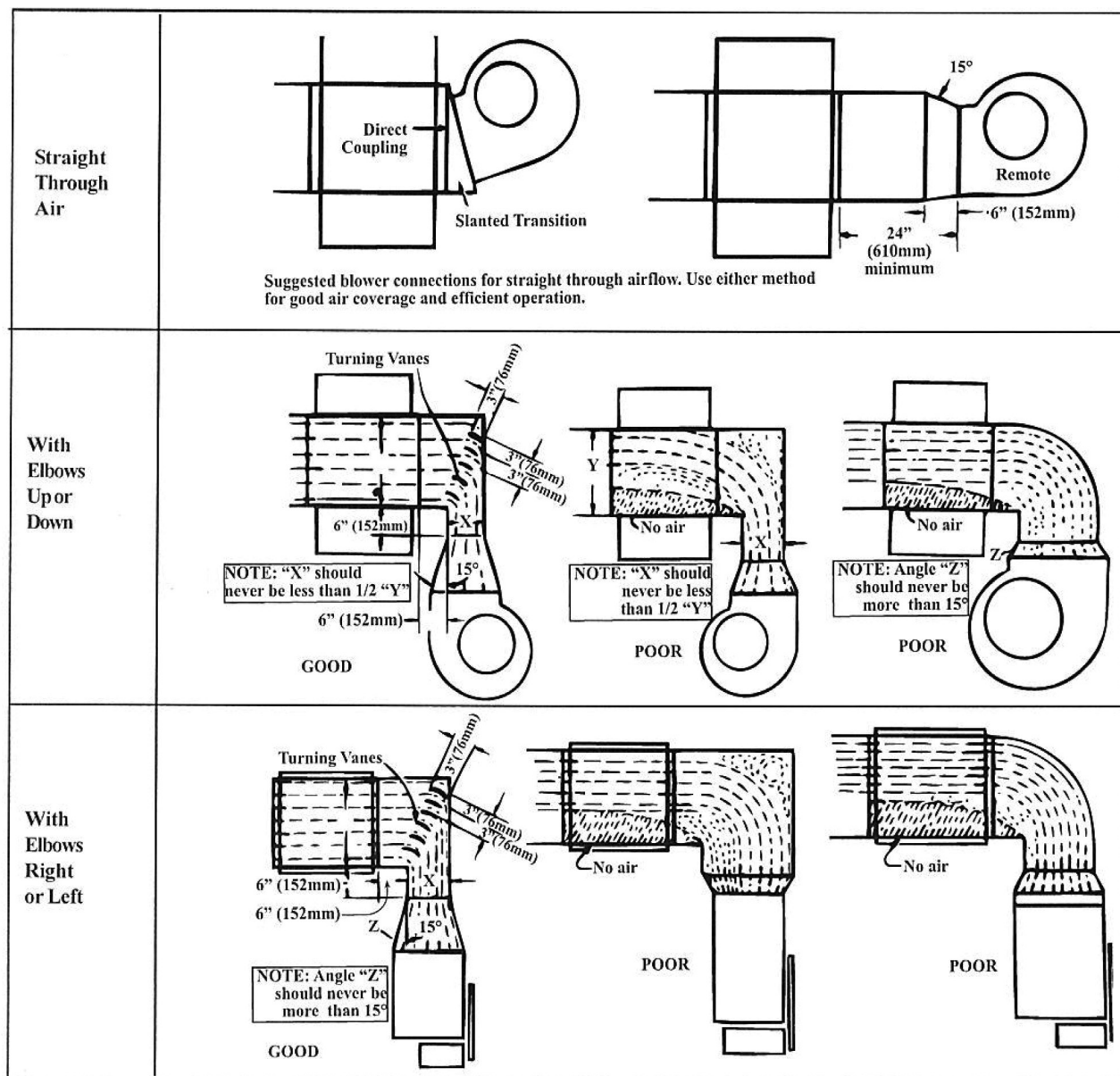


Figure 13. Suggested Blower Connections

INSTALLATION—CONTINUED

Duct Furnace Airflow Requirements—Continued

Bypass Duct Sizing

When the CFM of air throughput is greater than that which is desirable or permissible for the unit, a bypass duct (see [Figure 14](#)) may be constructed. Determine the correct size of the bypass duct as follows:

1. Refer to [Table 11](#) to determine pressure drop and allowable CFM for furnace being installed (e.g., standard size RP150 @ 50°F temperature rise: pressure drop = 0.38 and allowable CFM = 2210).
2. Subtract allowable CFM from **actual** CFM to determine how much air must be diverted through bypass duct (e.g., **actual** CFM = 3000: $3000 - 2210 = 790$ (bypass CFM)).
3. Refer to [Table 12](#) to determine duct size based on closest bypass CFM value in column topped by closest pressure drop value (e.g., pressure drop = 0.38 (go to 0.40 column) and bypass CFM = 790 (900 is closest value in that column), therefore, bypass duct A dimension (see [Figure 14](#)) = 3 inches (76 mm).

NOTES:

- The depth of the bypass duct is 18 inches on both inlet and outlet ends. The bypass duct must be located on the side opposite the controls and 2 inches from the heat exchanger side panel.
- Not all capacities are covered in [Table 12](#). If your installation is not covered, the correct size may be determined by consulting your Factory Representative.

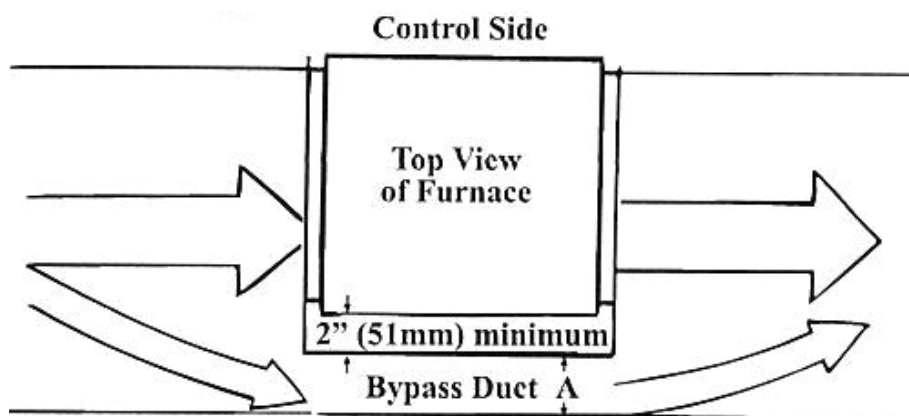


Figure 14. Bypass Duct

Table 12. Bypass Duct Sizing

Dimension A (See Figure 14) in Inches (mm)	Pressure Drop (IN WC)								
	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50
	Bypass CFM								
3 (76)	490	530	610	700	780	830	900	960	1010
4 (102)	630	750	870	980	1090	1160	1250	1310	1400
5 (127)	850	1010	1190	1300	1410	1520	1640	1730	1810
6 (152)	1050	1290	1480	1650	1800	1940	2090	2200	2320
7 (178)	1250	1510	1760	1960	2180	2320	2500	2650	2800
8 (203)	1490	1810	2100	2350	2560	2760	2940	3110	3290
9 (229)	1700	2100	2400	2700	2970	3200	3400	3600	3800
10 (254)	1920	2350	2760	3090	3650	4020	4300	4550	4800

Gas Piping and Pressures

⚠ DANGER ⚠

All components of a gas supply system must be leak tested prior to placing equipment in service. **NEVER TEST FOR LEAKS WITH AN OPEN FLAME.** Failure to comply could result in personal injury, property damage, or death.

⚠ WARNING ⚠

This appliance is equipped for a maximum gas supply pressure of 1/2 pound, 8 ounces, or 14 IN WC. Supply pressure higher than 1/2 pound requires installation of an additional service regulator external to the unit.

Observe the following when pressure-testing supply piping:

- At test pressures $>1/2$ PSI, disconnect the heater and manual valve from the gas supply line to be tested. Cap or plug the supply line.
 - At test pressures $<1/2$ PSI, close the manual valve on the heater before testing.
-
- All piping must be in accordance with requirements outlined in the National Fuel Gas Code ANSI/Z223.1a (latest edition) or CAN/CGA-8149.1 and B149.2. Gas supply piping installation should conform with good practice and with local codes. Duct furnaces for natural gas are orificed for operation with gas having a heating value of 1,000 BTU/h (± 50 BTU/h) per cubic foot. If the gas at the installation does not meet this specification, consult the Factory for proper orificing.
 - Pipe joint compounds (pipe dope) shall be resistant to the action of liquefied petroleum gas or any other chemical constituents of the gas being supplied.
 - Install a ground joint union and manual shutoff valve (see [Figure 15](#)) upstream of the unit control system. The 1/8-inch plugged tapping in the shutoff valve provides a connection for the supply line pressure test gauge. The National Fuel Gas Code requires the installation of a trap with a 3-inch (minimum) drip leg. Local codes may require a drip leg longer (typically 6 inches) than 3 inches.
 - The gas connection (**not** gas supply line size) to a single-stage valve (see [Figure 15](#) and [Figure 16](#)) is 1/2-inch for propane gas. For natural gas, the connection is 1/2-inch for unit sizes 75–250 and 3/4-inch for unit sizes 300–400.
 - After all connections are made, disconnect the pilot supply at the control valve and bleed the system of air. Reconnect the pilot line and leak-test all connections by brushing on a soap solution.
 - Install the gas supply piping (see [Figure 16](#)) so that when the union is disconnected, the supply pipe will not interfere with the removal of the burner rack, which slides out of the control side of the furnace.
 - Refer to [Table 13](#) for gas supply line sizing data.

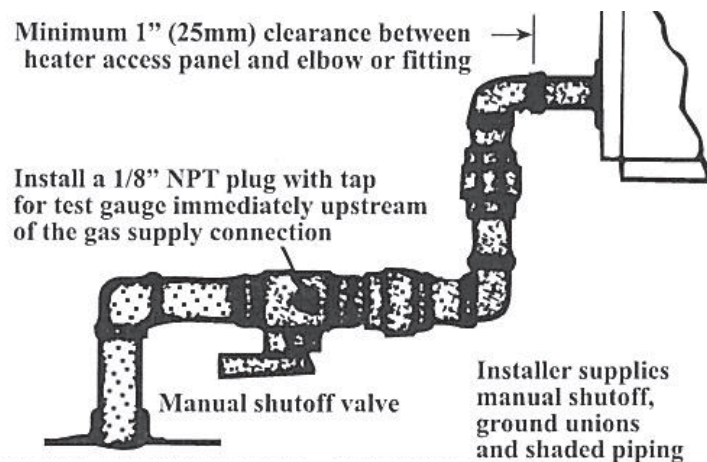


Figure 15. Connecting Gas Piping

INSTALLATION—CONTINUED

Gas Piping and Pressures—Continued

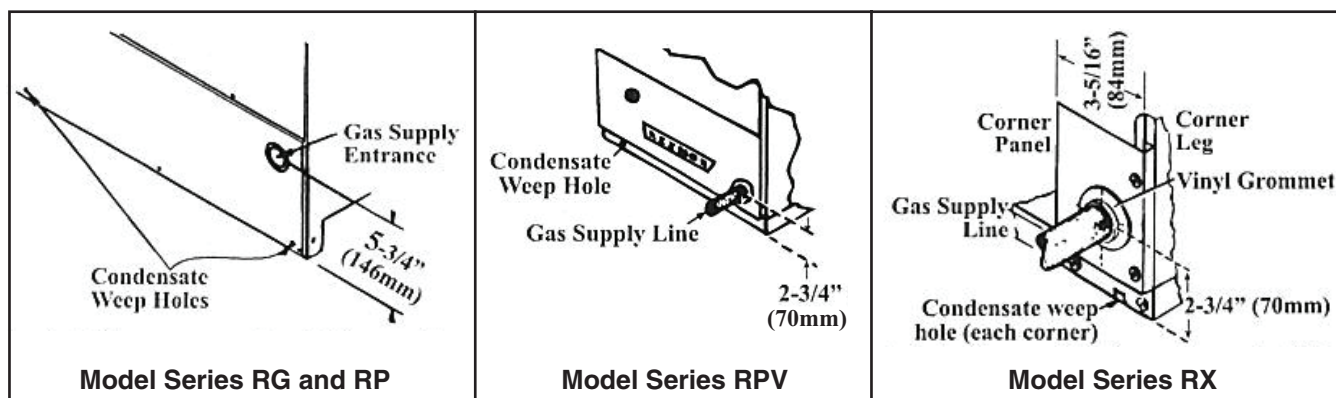


Figure 16. Gas Connection Location

Table 13. Gas Supply Line Sizes

Pipe Length (Feet)	Pipe Diameter (Inches)											
	1/2		3/4		1		1-1/4		1-1/2		2	
	Gas Type											
	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane
	Capacity (Cubic Feet per Hour)											
20	92	56	190	116	350	214	730	445	1100	671	2100	1281
30	73	45	152	93	285	174	590	360	890	543	1650	1007
40	63	38	130	79	245	149	500	305	760	464	1450	885
50	56	34	115	70	215	131	440	268	670	409	1270	775
60	50	31	105	64	195	119	400	244	610	372	1105	674
70	46	28	96	59	180	110	370	226	560	342	1050	641
80	43	26	90	55	170	104	350	214	530	323	990	604
90	40	24	84	51	160	98	320	195	490	299	930	567
100	38	23	79	48	150	92	305	186	460	281	870	531
125	34	21	72	44	130	79	275	168	410	250	780	476
150	31	19	64	39	120	73	250	153	380	232	710	433
175	28	17	59	36	110	67	225	137	350	214	650	397
200	26	16	55	34	100	61	210	128	320	195	610	372

NOTES:

When sizing supply lines, consider the possibility of future expansion and increased requirements. Refer to National Fuel Gas Code for additional information on line sizing.

Sizing of gas supply lines depends on piping capacity and is based on the following:

- Cubic feet per hour is based on a 0.3 IN WC pressure drop
- Specific gravity for natural gas: 0.6 (1000 BTU per cubic feet)
- Specific gravity for propane gas: 1.6 (2550 BTU per cubic feet)

Manifold or Orifice Pressure Settings

Measuring manifold gas pressure cannot be done until the heater is in operation (refer to [Post-Startup Checklist](#) section). The following warnings and instructions apply.

⚠ WARNING ⚠

Before attempting to measure or adjust manifold gas pressure, the inlet (supply) pressure must be within the specified range for the gas being used, both when the heater is in operation and when it is on standby. Incorrect inlet pressure could cause excessive manifold gas pressure immediately or at some future time.

NOTE: Always check the rating plate for minimum gas supply pressure.

- **For natural gas:** Manifold gas pressure is regulated by the combination valve to 3.5 IN WC. Inlet pressure to the valve must be a minimum of 5 IN WC or as noted on the rating plate and a maximum of 14 IN WC.
- **Minimum natural gas supply pressure:** Requirements vary based on size of burner and the gas control option. Most units require a minimum of 5 IN WC natural gas as stated above, but sizes 350 and 400 with electronic modulation require a minimum of 6 IN WC natural gas supply pressure. Sizes 300 and 350 with mechanical modulation require 7 IN WC.
- **For propane gas:** Manifold gas pressure is regulated by the combination valve to 10 IN WC. Inlet pressure to the valve must be a minimum of 11 IN WC and a maximum of 14 IN WC.

Checking Manifold Pressure

Check the manifold pressure as follows:

NOTE: A manometer (fluid-filled gauge) is recommended rather than a spring-type gauge due to the difficulty of maintaining calibration of a spring-type gauge.

1. With the manual valve (on the combination valve) positioned to prevent flow to the main burners, connect a manometer to the 1/8-inch pipe outlet pressure tap in the valve.
2. Open the valve and operate the heater. Measure the gas pressure to the manifold.
3. Normally, adjustments to the factory-preset regulator should not be necessary. If adjustment is necessary, set pressure to correct settings by turning the regulator screw IN (clockwise) to increase pressure. Turn the regulator screw OUT (counterclockwise) to decrease pressure. Consult the valve manufacturer's literature provided with the furnace for more detailed information.

High Elevation (>2,000 Feet/609 Meters) Installations

NOTES:

- **High elevation (>2,000 feet/609 meters) application with this unit depends on the installation elevation and the heating value of the gas. At high elevations, the heating value of natural gas is always lower than the heating value at sea level.**
 - **Deration is necessary to compensate for low atmospheric pressure at high elevations. Generally this will require obtaining the gas heating value from the local gas utility and replacing the burner orifices.**
-

For high elevation (>2,000 feet/609 meters) installations that require orifice replacement, replace the burner orifices as follows:

1. Determine model number and rated input (BTUh) from unit's rating plate.
2. Determine appropriate orifice replacement (refer to [Table 14](#)) for installation elevation.
3. Unthread existing gas orifices from gas manifold.

⚠ DANGER ⚠

- **Do not use Teflon tape or pipe joint compound on the orifice threads. The hole in the orifice may become blocked and may cause fire, explosion, property damage, carbon monoxide poisoning, personal injury, or death.**
 - **Use only using factory-supplied orifices. Do not attempt to drill out orifices in the field. Improperly drilled orifices may cause fire, explosion, carbon monoxide poisoning, personal injury, or death.**
-
4. Thread replacement gas orifices into gas manifold. To prevent cross-threading, hand-tighten orifices into gas manifold until snug and then tighten one-half to one turn using wrench.

INSTALLATION—CONTINUED

Gas Piping and Pressures—Continued

High Elevation (>2,000 Feet/609 Meters) Installations—Continued



DO NOT use an open flame to check for gas leaks.

5. Check all connections for gas leaks using commercial leak-detecting fluid or rich soap and water solution. Leaks are indicated by presence of bubbles. If leak is detected, tighten connection. If leak cannot be stopped by tightening connection, replace part(s).

Table 14. High Elevation Burner Orifices

Installation Altitude (Feet)	Installation Location	CRX Unit Size*	Natural Gas		Propane	
			PN	Orifice Size	PN	Orifice Size
2001–3000	US	075, 250	16590	#46	63922	1.15 mm
		100, 125, 175, 225, 250, 350, 400	11833	#44	11830	#55
2001–5000	Canada	075, 250	84853	#47	63922	1.15 mm
		100, 125, 175, 225, 250, 350, 400	11833	#44	11830	#55
3001–4000	US	075, 250	84853	#47	63922	1.15 mm
		100, 125, 175, 225, 250, 350, 400	11833	#44	11830	#55
4001–5000	US	075, 250	84853	#47	63922	1.15 mm
		100, 125, 175, 225, 250, 350, 400	11833	#44	11830	#55
5001–6000	US	075, 250	84853	#47	63922	1.15 mm
		100, 125, 175, 225, 250, 350, 400	38678	#45	39658	#56
6001–7000	US	075, 250	40414	#48	40416	#57
		100, 125, 175, 225, 250, 350, 400	40414	#45	39658	#56
7001–8000	US	075, 250	40414	#48	40416	#57
		100, 125, 175, 225, 250, 350, 400	40414	#46	39658	#56
8001–9000	US	075, 250	40414	#49	40416	#57
		100, 125, 175, 225, 250, 350, 400	40414	#47	39658	#56
9001–10,000	US	075, 250	40414	#49	39659	#58
		100, 125, 175, 225, 250, 350, 400	40414	#47	39658	#56

*All data applies only to model CRX units. RX, RG, and RPV models have been discontinued.

Conversion to LP (Propane)

DANGER

Conversion to LP (propane) gas must be performed by qualified service personnel using a factory-supplied conversion kit. Failure to use the proper conversion kit can cause fire, explosion, property damage, carbon monoxide poisoning, personal injury, or death.

If LP (propane) conversion is required, contact your Factory Distributor for instructions. When conversion is complete, verify that the input rate is correct.

Electrical Supply and Connections

NOTE: Ensure that all wiring is in accordance with the wiring diagram(s) provided with the unit.

WARNING

If you turn OFF the power supply, turn OFF the gas.

CAUTION

If any of the original wire as supplied with the appliance must be replaced, the replacement wiring material must have a temperature rating of at least 221°F (105°C), except for the limit control, the sensor lead, and the optional bypass damper combustion air safety circuit (option AG39 or AG40) wires, which must be rated at 302°F (150°C).

- All electrical wiring and connections, including electrical grounding, MUST be made in accordance with the National Electric Code ANSI/NFPA No. 70 (latest edition) or in Canada, the Canadian Electrical Code. Part 1-C.S.A. Standard C22.1. In addition, the installer should be aware of any local ordinances or gas company requirements that might apply.
- Check the rating plate on the heater for the supply voltage and current requirements. A separate line voltage supply with fused disconnect switch should be run directly from the main electrical panel to the furnace, making connection to leads in the junction box. All external wiring must be within approved conduit and must have a minimum temperature rise of 140°F (60°C). Conduit from the disconnect switch must be run so as not to interfere with the service panels of the furnace.
- If the heater has field-installed options that require electrical connections, consult the instruction sheet and wiring diagram supplied in the option package.

INSTALLATION—CONTINUED

Electrical Supply and Connections—Continued

Disconnect Switch

- A disconnect switch is a required part of this installation. Switches are available as options or parts or may be purchased locally. When ordered as an optional component, the disconnect switch is shipped separately.
- The disconnect switch may be fusible or non-fusible. When providing or replacing fuses in a fusible disconnect switch, use dual element time delay fuses and size to 1.25 times the maximum total input amps listed on the unit rating plate.
- When installing, take care to ensure that the conduit and switch housing are clear of furnace panels and inspection plates. Allow at least 4 feet of service room between the switch and the removable panels.

Control Thermostat

⚠ CAUTION ⚠

Ensure that the thermostat has an adequate VA rating for the total requirements. Add the coil rating of all relays and match the thermostat rating.

- A thermostat is not standard equipment but is an installation requirement. Use either an optional thermostat available with the heater or a field-supplied thermostat. Install in accordance with the thermostat manufacturer's instructions.
- A 24V thermostat must be used to actuate low-voltage gas controls. If line voltage from the thermostat to the unit is desired, consult the Factory Representative.
- Wiring between the thermostat and the heater must be suitable for a temperature rise of 140°F (60°C). Labeled thermostat leads are provided in the heater junction box for connecting thermostat wiring.
- Thermostats should be located 5 feet above the floor on an inside wall, not in the path of warm or cold air currents and not in corners where air may be pocketed. Do NOT install on cold air walls. For specific connection details, refer to instructions provided with the thermostat.
- If more than one unit is cycled from one thermostat, separately-activated relays must be substituted at unit thermostat connections.
- Low-voltage (24V) thermostats are equipped with heat anticipators that level out unit cycling for optimum temperature control. Set the heat anticipator at full load control amps.

24V Controls

Refer to [Table 15](#), which lists the maximum amps for the 24V controls.

Table 15. Maximum Amps for 24V Controls			
Control	Maximum Amps	Control	Maximum Amps
Single-stage valve	0.6	Fan control heater	0.12
Two-stage valve	0.6	Time delay relay heater	0.1
Maxitrol system	0.5	Relay coil	0.12
Spark ignition system	0.1		

NOTE: The 24V transformer has a 20VA capacity.

Control Wiring

Refer to [Table 16](#) for field-supplied control wiring size data.

Table 16. Field-Supplied Control Wiring Sizes		
Distance from Unit to Control (Feet (Meters))	Minimum Recommended Wire Gauge (AWG)	Total Wire Length (Feet (Meters))
75 (23)	#18	150 (46)
125 (38)	#16	250 (76)
175 (53)	#14	350 (107)

Component Descriptions and Adjustments

Limit Control

The heater is equipped with a non-adjustable high limit switch that shuts OFF the gas in the event of motor failure, lack of air due to dirty filters, or restrictions at the inlet or outlet of the unit.

Optional Fan Control

- The optional fan control provides a 45-second delay for blower operation to prevent the discharge of cold air and it provides blower operation as long as the unit is hot.
- The fan control provides additional safety by keeping the blower in operation in the event of failure of the gas valve to close when the thermostat is satisfied.
- To ensure that the blower can continue to operate, the power supply to the furnace MUST NOT be interrupted except when servicing the unit.
- If the customer wants the furnace off at night, the gas valve circuit SHOULD BE OPENED by a single-pole switch wired in-series with the thermostat. Some thermostats have this feature. Multiple units controlled from a single thermostat are shut OFF in the same manner. For proper operation, ensure that the fan control wiring is in accordance with the wiring diagram.
- The fan control contains a built-in heater to control delay times. For proper operation, refer to the wiring diagram provided with the furnace.

Combustion Air Proving Switch (Power-Vented Models)

⚠ WARNING ⚠

Safe operation requires proper venting flow. Never bypass the combustion air proving switch or attempt to operate the unit without the venter running and proper flow in the vent system. Hazardous condition could result.

- The combustion air proving switch, which ensures that proper combustion airflow is available, is a pressure switch.
- The switch is a single-pole, double-throw switch that senses pressure caused by the flow of combustion air from the venter.
- To prevent the switch from responding to sudden temporary pressure fluctuations and to provide a pre-purge, a small diameter orifice is installed in the outlet fitting of the pressure switch.
- The electrical circuit of this heater is designed to check for proper switch position before each complete heat cycle. Only after checking the state of the pressure switch and proving that combustion air is present, will the gas ignition sequence begin.

Gas Valve

⚠ WARNING ⚠

The operating valve is the prime safety shutoff. All gas supply lines must be free of dirt or scale before connecting the unit to ensure positive closure.

All furnaces are equipped with a 24V combination valve that includes the automatic electric ON-OFF valve controlled by the room thermostat, the pressure regulator, the safety pilot valve, and the manual shutoff valve. The standard gas valve allows for single-stage control from a single-stage, 24V thermostat.

Optional Two-Stage Operation Heating Only Application

The standard combination control valve is replaced with a two-stage combination gas control valve providing for low fire or high fire operation controlled by a two-stage thermostat. First stage (low fire) is factory-set (not field-adjustable). Both high and low stages are controlled by a Servo regulator that maintains constant gas input under wide variations in gas supply pressure. Refer to the instructions packed with the unit for specific gas valve specifications, wiring, and operating instructions.

INSTALLATION—CONTINUED

Component Descriptions and Adjustments—Continued

Optional Two-Stage Operation—Makeup Air Application

- Two-stage makeup air units are equipped with a two-stage gas valve but instead of control from a two-stage room thermostat, the outlet air temperature is monitored and controlled by a two-stage ductstat. When the discharge air temperature drops to the setpoint, low fire is energized. If low fire cannot satisfy the ductstat setting, high fire is energized.
- Makeup air applications are usually adjusted to discharge an outlet air temperature of between 65°F and 75°F. In all applications, the allowable temperature rise of the furnace in the installation dictates the limits of the ductstat temperature setting.
- Depending on the option selection, the factory-installed sensor is either field-connected by capillary tubing to the unit-mounted ductstat or electrically-connected to a remote electronic temperature selector (see [Figure 17](#)). The remote temperature selector is available with or without a display module. See [Figure 18](#) for a general location of the factory-installed sensor with either the factory-mounted or remote ductstat selector option.
- Optional ductstat with capillary tubing (option AG3):** Either of the option AG3 controls shown in [Figure 17](#) is used with the optional ductstat with capillary tubing. Both controls are factory-set to 70°F and have an adjustable range with a fixed differential of 2.5°F. Due to different CFM settings and outside air temperatures, the average downstream outlet temperature may not exactly match the ductstat setting. After the installation is complete, adjust the setpoint of the ductstat to achieve the desired average outlet air temperature.
- Optional ductstat with electronic remote setpoint module (option AG15 or AG16):** The field-installed sensing probe is field-wired to a remote temperature selector with an operating range up to 130°F. The remote modules and sensing probe shown in [Figure 17](#) are shipped separately for field-installation. There will be one module for selecting temperature and one stage-adder module. The digital display module is optional. Follow the wiring diagram provided with the unit and the manufacturer's instructions for wiring and installation.

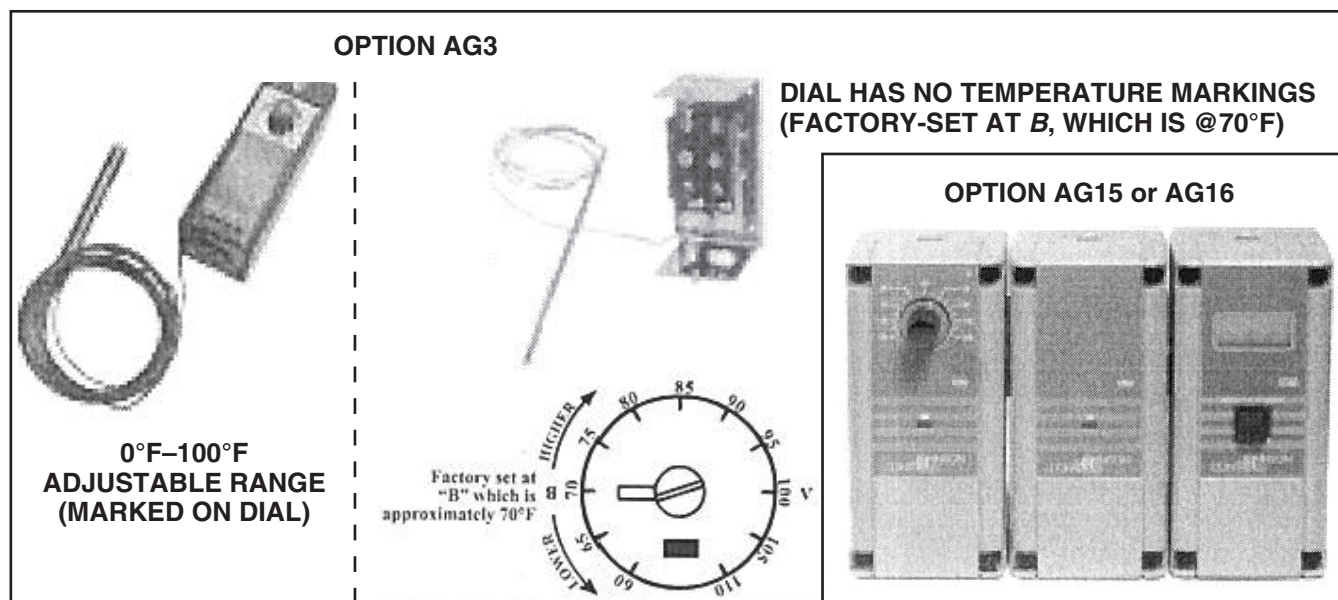


Figure 17. Makeup Air Two-Stage Controls

Optional Mechanical Modulation—Makeup Air Application

NOTE: Unit sizes 300 and 350 with mechanical modulation require a minimum of 7 IN WC natural gas supply pressure.

- The mechanical modulation valve regulates the flow of gas to the main burner, depending on the demands of the sensing bulb, which is located in the airstream adjacent to the heat exchanger.
- Inputs are varied from 50% through 100% of full rate in direct response to the modulating control sensing element and depending on the temperature of outside air being forced through the furnace. Outlet air or return air temperature can be maintained within a range of 50°F–100°F (option AG6) and is adjustable at the mechanical modulating valve.

- Valve manufacturer's specifications and operating instructions for the mechanical modulating valve may be found in the heater instruction envelope provided with the furnace.
- The general location of the factory-installed sensor is shown in [Figure 18](#). Access the sensor element as follows:
 - a. Remove access panel in ductwork adjacent to control compartment access panel.
 - b. Locate spring clips that secure element.
 - c. Round gasket and metal retaining plate provide airtight seal for capillary and must be removed to remove element.

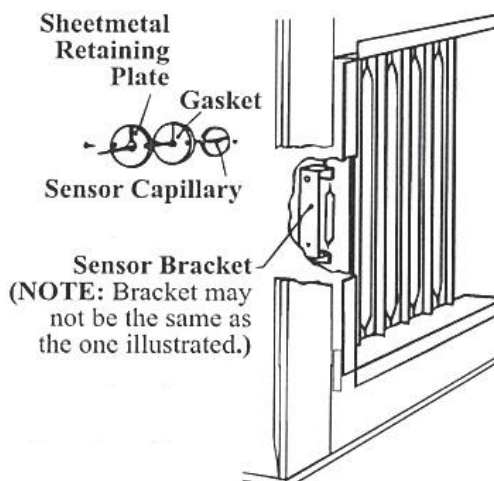


Figure 18. Duct Temperature Sensor Location

Optional Electronic Modulation

The type and capability of the electronic modulation system depends on the option selected. Electronic modulation options are identified by a suffix to the serial No. printed on the heater rating plate as follows:

AG7 is identified as MV-1
 AG9 is identified as MV-4
 AG8 is identified as MV-3

AG21 is identified as MV-A
 AG39 is identified as MP-1
 AG40 is identified as MP-2

NOTE: Unit sizes 350 and 400 with electronic modulation require a minimum of 6 IN WC natural gas supply pressure.

- **Electronic modulation between 50% and 100% firing rate (options AG7, AG8, and AG9):** Depending on the heat requirements established by the thermistor sensor, the burner modulates between 100% and 50% firing. The thermistor is a resistor that is temperature-sensitive in that as the surrounding temperature changes, the ohms resistance changes through the thermistor. This change is monitored by the solid-state control center (amplifier), which provides a varying DC current to the modulating valve to adjust the gas input.
- **Modulating valve:** Each modulating valve is basically a regulator with the electrical means for raising and lowering the discharge pressure. When no DC current is fed to the valve, it functions as a gas pressure regulator that supplies 3.5 IN WC of pressure to the main operating valve.
- **Electronic modulation wiring connections:** Refer to the wiring diagram supplied with the furnace for proper wiring connections. Electronic modulation for heating controlled by a specially-designed room thermostat (60°F–85°F) is identified as option AG7. Electronic modulation control systems for makeup air applications controlled by a duct sensor and a temperature selector (55°F–90°F) are identified as either option AG8 or AG9. The temperature selector setting for option AG8 is on the amplifier. Option AG9 has a remote temperature selector. Both systems are available with an override thermostat.
- **Computer-controlled electronic modulation between 50% and 100% firing rate (option AG21):** With this option, the furnace is equipped with a Maxitrol A200 signal conditioner (see [Figure 19](#)) that operates much the same way as the amplifier in options AG7, AG8, and AG9 to control the regulator valve. The conditioner accepts an input signal of either 4–20 milliamps or 0–10 volts from a customer-supplied control device such as a computer. With the dip switches on the conditioner in the ON positions, the conditioner accepts a 4-20 milliamp signal. In the OFF positions, the conditioner accepts a 0–10V signal. The conditioner converts the signal to the 0–20V DC current required to control the modulating valve. Temperature selection is through the computer software.

INSTALLATION—CONTINUED

Component Descriptions and Adjustments—Continued

Optional Electronic Modulation—Continued



Figure 19. Maxitrol A200 Signal Conditioner

Horizontal Pilot

The horizontal pilot is located in the control end of the burner rack and is accessed by removing the control compartment panel. All pilots are target-type with the lint-free feature. Pilot gas pressure should be the same as supply line pressure (refer to [Gas Piping and Pressures](#) section). If required, adjust the pilot flame length to approximately 1-1/4-inch using the pilot adjustment screw in the control valve body.

Intermittent Spark Ignition Safety Pilot Systems

⚠ WARNING ⚠

Due to high voltage on pilot spark wire and pilot electrode, do not touch when energized.

Intermittent spark pilot: There are two types of intermittent spark pilots (see [Figure 20](#)): one type shuts off the pilot gas flow between cycles and the other not only shuts off pilot gas flow between cycles but also has a lockout device that stops gas flow to the pilot if the pilot fails to light in 120 seconds. This lockout feature requires manual reset by interruption of the thermostat circuit. Propane units installed in Canada require a spark ignition system with a lockout device. A spark pilot without lockout is option AH2 and with lockout is option AH3. Refer to the wiring diagram supplied with the heater for pilot system identification and wiring.

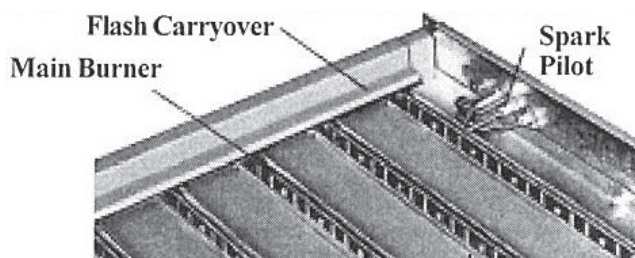


Figure 20. Burner Rack with Spark Pilot

Ignition controller: As part of the intermittent safety pilot system, the ignition controller provides a high-voltage spark to ignite the pilot gas and also acts as a flame safety device. After ignition of pilot gas, the ignition controller electronically senses the pilot flame. A low-voltage DC electrical signal is imposed on the separate metal probe in the pilot assembly. The metal probe is electrically insulated from ground. The pilot flame acts as a conduction path to ground, completing the DC circuit and proving pilot flame. With pilot flame proven, the ignition controller energizes the main gas valve. If no spark occurs, check the following:

NOTE: When checking for spark with the pilot burner assembly removed from the burner rack, the pilot assembly must be grounded to the heater for proper spark.

1. Voltage between blue and white terminals (non-lockout type pilot) and terminals 2 and 5 (lockout type pilot) on ignition controller should be at least 20V and no higher than 32V. Refer to [TROUBLESHOOTING](#) section if no voltage is observed.
2. Short to ground in high-tension lead and/or ceramic insulator.
3. Pilot spark gap should be approximately 7/64-inch (see [Figure 21](#)).

4. If conditions in steps 1, 2, or 3 are normal and no spark occurs, replace ignition controller.
5. If main gas valve fails to open with normal full-sized pilot flame established, check following:
 - a. If voltage between black and brown leads on main gas valve is 20–32VAC and there is no main gas flow with built-in manual valve in FULL OPEN position, main valve is defective.
 - b. If there is no voltage between black and brown leads on main gas valve, check for disconnected or shorted flame sensor lead or flame sensor probe.
6. When above conditions are normal and main gas flow is still off, ignition controller is probably defective.

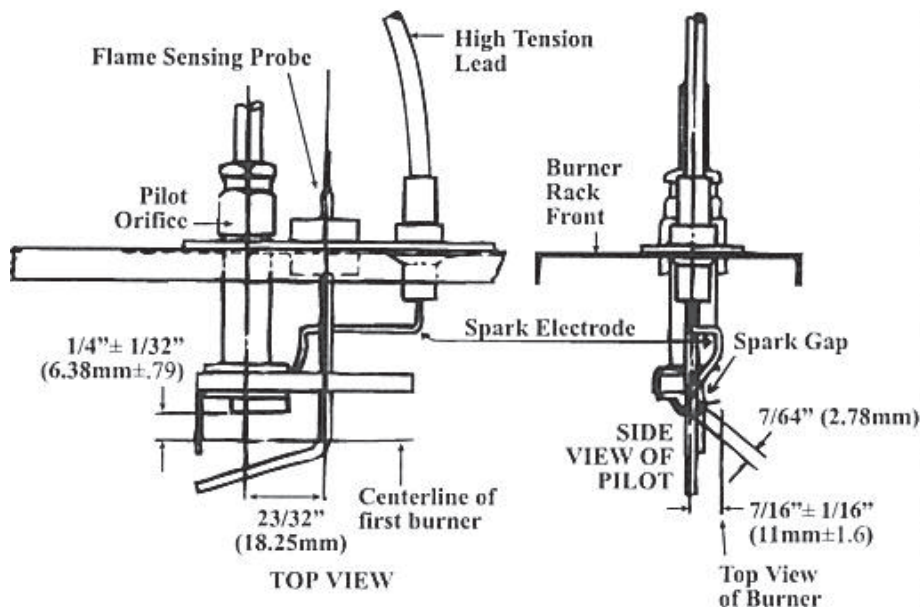


Figure 21. Pilot Assembly

Burners and Carryover System

These duct furnaces have individually-formed natural gas or propane steel burners with accurately die-formed ports to provide controlled flame stability without lifting or flashback. The burners are lightweight and factory-mounted in an assembly that allows them to be removed as a unit for inspection or service.

Burner Racks

Natural gas burner racks (except when equipped with electronic modulation option AG39 or AG40 (refer to [Optional Electronic Modulation](#) section)) are equipped with two flash carryovers. Propane gas burners are equipped with one flash carryover and a regulated gas lighter tube system. During regular service, check to ensure that the main burner ports, the carryover assemblies, and the orifices are clean.

Burner Air Adjustment

⚠ DANGER ⚠

Failure to install and/or adjust air shutters according to directions could cause property damage, personal injury, and/or death.

NOTES:

- **Burner air shutters are not normally required on natural gas furnaces. Air shutters are required on propane gas units and may require adjustment.**
- **Before making any adjustments to air shutters, allow heater to operate for about 15 minutes with air shutters open.**
- **A limited amount of yellow-tipping is permissible for liquefied petroleum gases. Natural gas should not display any yellow-tipping.**

INSTALLATION—CONTINUED

Component Descriptions and Adjustments—Continued

Burner Air Adjustment—Continued

Adjust the burner air shutters as follows:

1. After furnace has been in operation for 15 minutes, close air shutters and observe flame for yellow-tipping.
2. Slotted screw on end manifold bracket moves air shutters and adjusts all burners simultaneously. If flame shows yellow-tipping, open shutters until yellow tip disappears by turning screw clockwise.
3. Turning slotted screw on end manifold bracket counterclockwise closes shutters. If making this adjustment, close air shutters no more than is necessary to eliminate problem condition.

OPERATION

⚠ DANGER ⚠

- **The gas burner in this gas-fired equipment is designed and equipped to provide safe and economically-controlled complete combustion. However, if the installation does not permit the burner to receive the proper supply of combustion air, complete combustion may not occur. The result is incomplete combustion, which produces carbon monoxide, a poisonous gas that can cause death. Safe operation of indirect-fired gas burning equipment requires a properly-operating venting system that vents all flue products to the outside atmosphere. FAILURE TO PROVIDE PROPER VENTING WILL RESULT IN A HEALTH HAZARD THAT COULD CAUSE SERIOUS PERSONAL INJURY OR DEATH.**
- **Always comply with the combustion air requirements in the installation codes and instructions. Combustion air at the burner should be regulated only by manufacturer-provided equipment. NEVER RESTRICT OR OTHERWISE ALTER THE SUPPLY OF COMBUSTION AIR TO ANY HEATER.**

Pre-Startup Checklist

Check the installation prior to startup as follows:

- ☐ Ensure that electrical supply matches voltage rating of furnace (refer to unit rating plate)
- ☐ Check all field wiring against wiring diagram—ensure that wire gauges are as required for electrical load
- ☐ Ensure that electrical entrances are sealed against weather
- ☐ Ensure that fuses or circuit breakers are in place and are sized correctly
- ☐ Ensure that all condensate drains are open (refer to [Condensate Drain](#) section)
- ☐ Check clearances from combustibles (refer to [Clearances](#) section)
- ☐ Check piping for leaks and for proper gas line pressure (refer to [Gas Piping and Pressures](#) section)—as necessary, bleed trapped air from gas lines as follows:
 - a. Turn manual shutoff valve to OFF position and turn ON gas supply
 - b. Observe gas meter for movement or connect pressure gauge (readable to 0.1 IN WC) and after turning gas ON for 10 seconds, turn OFF gas supply—no change in pressure should occur over 3-minute period
 - c. If step c indicates leak, locate leak by brushing soap solution on all fittings—leak(s) indicated by bubbles
 - d. Repair leak(s) and repeat steps a through d as necessary
- ☐ **Power-vented models:** check to ensure that flue discharge openings are free from obstructions
- ☐ **Gravity-vented models:** ensure that vent cap is properly installed and that vent cap extension is installed if required (refer to [Gravity-Vented Outdoor Models \(H\)-RX,CRX,RG,CRG](#) section)

Startup Checklist

NOTE: If the flame is extinguished during main burner operation, the safety switch closes the main valve and recycles the spark gap. On units equipped with a G770NGC-4 controller, which includes lockout control, if the pilot is not established within approximately 120 seconds, the unit locks out and must be reset by interrupting the power to the control circuit (refer to the lighting instructions provided with the furnace).

- ☐ Turn ON electric and gas supply to furnace
- ☐ Adjust thermostat or ductstat so that call for heat exists
- ☐ Observe for complete sequencing of safety pilot and ignition
- ☐ **Gravity-vented models:** observe following operating sequence:
 - a. Set thermostat switch to lowest setting
 - b. Follow lighting instructions provided with furnace
 - c. Set thermostat switch to desired setting—thermostat calls for heat, energizes ignition controller and pilot gas valve, and lights pilot
 - d. Sensing probe proves pilot flame, de-energizes ignitor, and energizes gas valve
 - e. Optional fan control senses heat exchanger temperature and energizes motor on attached blower
 - f. Set thermostat switch to lowest setting for shutdown
 - g. Optional fan control maintains blower motor ON while unit is hot
- ☐ **Power-vented models:** observe following operating sequence:
 - a. Set thermostat switch to lowest setting
 - b. Turn ON power: main and manual gas valves
 - c. Firing rate is controlled by thermostat and blower motor operation is based on heat exchanger temperature
 - d. Set thermostat switch to desired setting—thermostat calls for heat, venter motor is energized after approximate 15-second time delay, and venter flow switches from NC to NO contacts, which energizes pilot gas valve and spark gap to produce pilot flame on each operating cycle
 - e. Sensing probe proves pilot flame and energizes safety switch portion of control, which de-energizes spark gap and energizes main valve
 - f. Main gas ignites and unit fires at full rate

Post-Startup Checklist

- ☐ While unit is operating, measure manifold gas pressure (refer to [Checking Manifold Pressure](#) section)—manifold pressure should be 3.5 IN WC for natural gas or 10 IN WC for propane
- ☐ Turn unit OFF and ON, pausing 2 minutes between each cycle
 - a. Observe for smooth ignition
 - b. On two-stage or modulating burner systems, manipulate temperature adjustment slowly up and down to see if control is sequencing or modulating properly
 - c. Raising temperature setting drives burner ON or to full fire
- ☐ Observe burner flame at full fire
 - a. Both natural gas and propane flames should be about 1-1/2 inches high with blue coloring
 - b. Yellow tipping may appear on propane flame
 - c. If yellow tip extends beyond 1/2- to 3/4-inch, adjust air shutters (refer to [Burner Air Adjustment](#) section)
- ☐ Close all panels tightly and, with heater on, check limit control by completely blocking off distribution air—limit control should open within few minutes, shutting OFF gas supply to main burners
- ☐ Return all instruction forms and warranty information to *owner's envelope* (keep for future reference)

MAINTENANCE

This unit will operate with a minimum of maintenance. To ensure long life and satisfactory performance, a furnace operating under normal conditions should be inspected every four months. If the furnace is operating in an area where an unusual amount of dust or soot or other impurities are present in the air, more frequent inspection is recommended.

Maintenance Schedule

The following procedures should be carried out at least annually.

- ☐ Clean all dirt and grease from primary and secondary combustion air openings
- ☐ Clean heat exchanger both internally and externally
- ☐ Check pilot burner and main burners for scale, dust, or lint accumulation—clean as necessary
- ☐ **Power-vented models:** check flue products outlet—clean as necessary
- ☐ **Gravity-vented models:** check vent cap or optional vent system—replace any parts that do not appear sound
- ☐ Check wiring for any damaged wire—replace as necessary

Maintenance Procedures

WARNING

- If you turn OFF the power supply, turn OFF the gas.
 - When cleaning furnace components, wearing eye protection is recommended.
-

CAUTION

If replacement parts are required, use only factory-authorized parts.

Burner Maintenance

1. Remove burner rack as follows:
 - a. Turn OFF gas supply.
 - b. Turn OFF electric supply.
 - c. Remove control access side panel.
 - d. Disconnect pilot tubing and flame sensor lead.
 - e. Mark and disconnect electric valve leads.
 - f. Uncouple union in gas supply.
 - g. Remove sheet metal screws in top corners of burner rack assembly.
 - h. Pull *drawer-type* burner rack out of furnace.
2. Disassemble burner rack as follows:
 - a. Remove carryover system. For natural gas burner racks manufactured **before** MAR 1995, which have lighter tube carryover system, break lighter tube connection at orifice and remove supply tubing, drip shield, and lighter tube. For natural gas burner racks manufactured **after** FEB 1995, remove flash carryover system from manifold end of burner rack. For propane burner racks, break lighter tube connection at regulator and remove lighter tube orifice supply tubing. Remove retaining screws in drip shield and then shield and remove retaining screws and slide out lighter tube.
 - b. Pull main burners horizontally away from injection opening and lift them out.
 - c. Remove manifold bracket screws and remove manifold.
 - d. Change main burner orifices if necessary.
 - e. Remove screws and lift out pilot burner.

3. Clean main burners and pilot burner as follows:
 - a. Clean main burners using air pressure to blow out scale and dust accumulation from burner ports.
 - b. Alternately blow air through burner ports and venturi.
 - c. Use fine wire to dislodge any stubborn particles. Do not use anything that might change port size.
 - d. Clean burner rack carryover systems using air pressure.
 - e. If pilot flame is short and/or yellow, check pilot orifice for blockage caused by lint or dust accumulation. Remove pilot orifice and clean using air pressure. **DO NOT REAM ORIFICE!**
 - f. Check and clean aeration slot in pilot burner.
 - g. If furnace is equipped with optional spark pilot, clean metal sensing probe and pilot hood using emery cloth and wipe off ceramic insulator. Ensure that spark gap is maintained at 7/64-inch.
 - h. After pilot is cleaned, blow any dirt away using compressed air.

⚠ WARNING ⚠

When any service is completed, ensure that the unit is reassembled correctly so that no unsafe conditions are created.

4. Re-assemble and replace burner rack by reversing procedures in steps 2 and 1.

Heat Exchanger Maintenance

Clean the outer (circulating air side) surfaces of heat exchanger as follows:

1. To gain access, remove inspection panels in ductwork or remove ductwork.

NOTES:

- Depending on whether or not the furnace is designed for high CFM (model prefix *H*), there may be directional baffles between the heat exchanger tubes.
 - The standard furnace has baffles between the heat exchanger tubes as shown in [Figure 4](#).
 - High CFM furnaces have only the top baffle support, which does not need to be removed for cleaning.
-

2. To remove baffles, remove A screws (see [Figure 4](#)) and slide each baffle forward.
3. Use brush and/or air hose to remove accumulated dust and grease deposits from heat exchanger tubes and baffles.
4. Re-install baffles by sliding them into rear slots and replacing A screws.

Clean the inner (combustion air side) surfaces of heat exchanger as follows. An air hose, a 18–24-inch-long 1/2-inch-diameter furnace brush or heavy wire with steel wool securely attached, a flashlight, and a mirror are required tools.

1. To gain access, remove burner rack (refer to [Burner Maintenance](#) section).

NOTES:

- The required procedure depends on the date of manufacture and on whether or not the furnace is rated for high (80%) efficiency.
 - Furnaces designed to provide high-efficiency heating have V-shaped baffles in the top of each heat exchanger tube.
 - High-efficiency furnaces manufactured *before* MAR 1995 have a *C* prefix in their model number.
 - All furnaces manufactured *after* FEB 1995 are designed for high efficiency and have V-shaped heat exchanger baffles.
-

MAINTENANCE—CONTINUED

Maintenance Procedures—Continued

Heat Exchanger Maintenance—Continued

2. Remove V-shaped baffles from gravity-vented models (see [Figure 22](#)) as follows:
 - a. Remove ends of flue gas collection box.
 - b. On control side of furnace, remove block-off plate to gain access to collection box end.
 - c. For unit sizes 75–175, remove one tube baffle retaining angle on each inside wall of collection box. Each tube baffle angle has one screw.
 - d. For unit sizes 200–400, remove screw at each end of flue diverter and slide flue diverter out of furnace.
 - e. Pull V-shaped baffles out of heat exchanger.
3. Remove V-shaped baffles from power-vented models as follows:
 - a. Remove ends of flue gas collection box.
 - b. On control side of furnace, remove venter assembly and flue outlet duct to gain access to collection box end.
 - c. For unit sizes 125–300, remove one tube baffle retaining angle on each inside wall of collection box. Each tube baffle angle has one screw.
 - d. For unit size 400, remove inner baffle from flue collection box. On control side, align inner baffle with slot in collection box edge and pull inner baffle until it clears heat exchanger. Remove screw at each end and slide flue diverter out of furnace.
 - e. Pull V-shaped baffles out of heat exchanger.
4. Clean inner surfaces of heat exchanger from beneath using brush to scrub tube walls to remove any accumulated dust, rust, and soot.

⚠ WARNING ⚠

When any service is completed, ensure that the unit is reassembled correctly so that no unsafe conditions are created.

5. Clean V-tubes and re-assemble heat exchanger and furnace.
6. Check furnace to ensure proper operation.

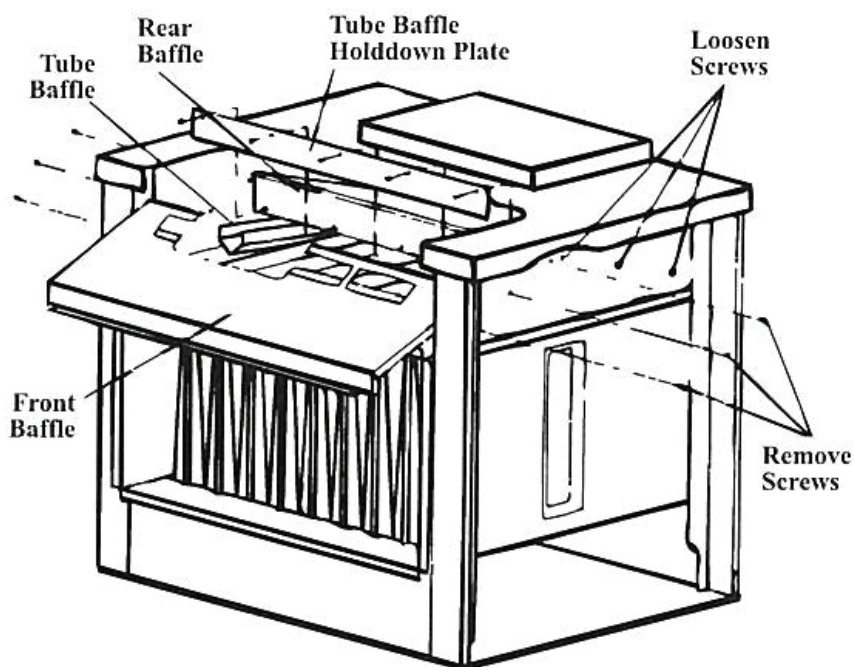


Figure 22. Heat Exchanger V-Shaped Baffles

TROUBLESHOOTING

Table 17. General Troubleshooting		
Symptom	Probable Cause	Remedy
Venter motor will not start (power-vented model)	1. No power to furnace	Turn on power Check supply fuses or circuit breaker
	2. No 24V power to venter relay	Turn up thermostat Check control transformer output Check for loose or improper wire connections
	3. Venter relay defective	Replace relay
	4. Defective motor or capacitor	Replace defective part
Pilot will not light (venter operating on power-vented models)	1. Manual valve not open	Open manual valve
	2. Air in gas line	Bleed gas line
	3. Dirt in pilot orifice	Remove and clean using compressed air or solvent (DO NOT REAM)
	4. Gas pressure too high or too low	Adjust supply pressure (refer to Gas Piping and Pressures section)
	5. Kinked pilot tubing	Replace tubing
	6. Pilot valve does not open	If 24V power is available at valve, replace valve
	7. No spark	
	a) Loose wire connections	Ensure that all wires connections are solid
	b) Transformer failure	Ensure that 24V power is available
	c) Incorrect spark gap	Maintain spark gap at 7/64-inch'
	d) Spark cable shorted to ground	Replace worn or grounded spark cable
	e) Spark electrode shorted to ground	Replace pilot if ceramic spark electrode is cracked or grounded
	f) Drafts affecting pilot	Ensure that all panels are in place and tightly-secured to prevent drafts at pilot
	g) Ignition control not grounded	Ensure that ignition control is grounded to furnace chassis
	h) Faulty ignition controller	If 24V power is available to ignition controller and all other causes have been eliminated, replace ignition controller*
	8. Optional lockout device interrupting control circuit by above causes	Reset lockout by interrupting control at thermostat
	9. Faulty combustion air proving	Replace combustion air proving switch
Pilot lights but main valve does not open	1. Manual valve not open	Open manual valve
	2. Main valve not operating	
	a) Defective valve	If 24V power is measured at valve connections and valve remains closed, replace valve
	b) Loose wire connections	Check and tighten all wiring connections
	3. Ignition control does not power	
	a) Loose wire connections	Check and tighten all wiring connections
	b) Flame sensor grounded, pilot lights, and spark continues	Ensure that flame sensor lead is not grounded; replace as necessary Ensure that insulation or ceramic is not cracked; replace as necessary
	c) Gas pressure incorrect	Set supply pressure at 5–8 IN WC for natural gas Set supply pressure at 11 IN WC for propane
	d) Cracked ceramic at sensor	Replace sensor
	e) Faulty ignition controller	If 24V power is available to ignition controller and all other causes have been eliminated, replace ignition controller*
No heat (heater operating)	f) Poor micro-amp signal	Adjust pilot regulator
	1. Dirty filters in blower system	Clean or replace filters
	2. Incorrect manifold pressure or orifice(s)	Check manifold pressure (refer to Checking Manifold Pressure section)
	3. Cycling on limit control	Check air throughput (refer to Duct Furnace Airflow Requirements section)
	4. Improper thermostat location	Refer to thermostat manufacturer's instructions
Cold air on startup during operation	5. Belt slipping on blower	Adjust belt tension
	1. Fan control improperly wired	Ensure that wiring is in accordance with wiring diagram
	2. Defective fan control	Replace fan control
	3. Incorrect manifold pressure	Check manifold pressure (refer to Checking Manifold Pressure section)
	4. Blower set for too low temperature rise	Slow down blower or increase static pressure
*Do not attempt to repair the ignition controller, which has no field-replaceable parts.		

INSTALLATION RECORD (TO BE COMPLETED BY INSTALLER)

Model	Serial No.	Date of Installation	Notes
	Installer	Distributor	
Name			
Company			
Address			
Phone No.			

For more information on Reznor HVAC products:

- **Contact your local Reznor representative at 1-800-695-1901**
- **Refer to the manuals and additional consumer materials found at www.reznorhvac.com**

