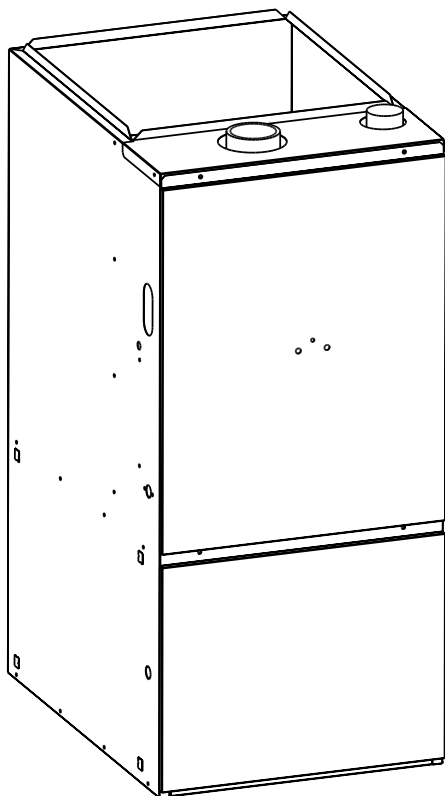


## Gas Furnaces

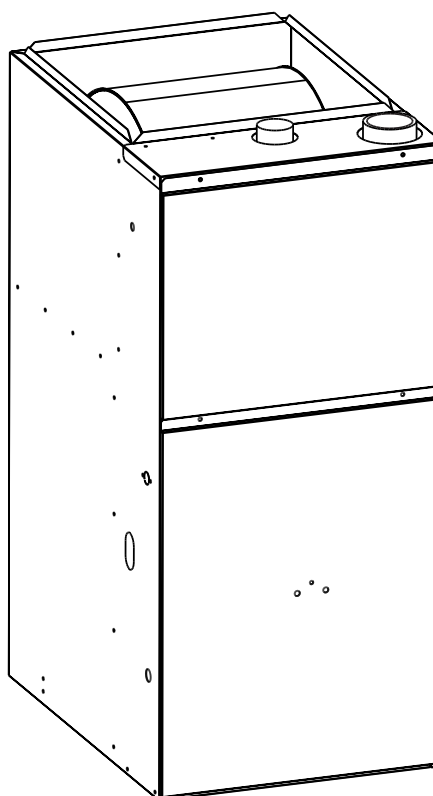
# Installation Instructions

\*RC 92+ Full Size Upflow Condensing Furnace

\*RL 90+ Full Size Downflow Condensing Furnace



\*RC 92+ Upflow



\*RL 90+ Downflow



### WARNING:

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

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Read all instructions carefully before starting the installation.

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



### FOR YOUR SAFETY:

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



### FOR YOUR SAFETY:

#### 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.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Extinguish any open flame.



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# FURNACE SPECIFICATIONS

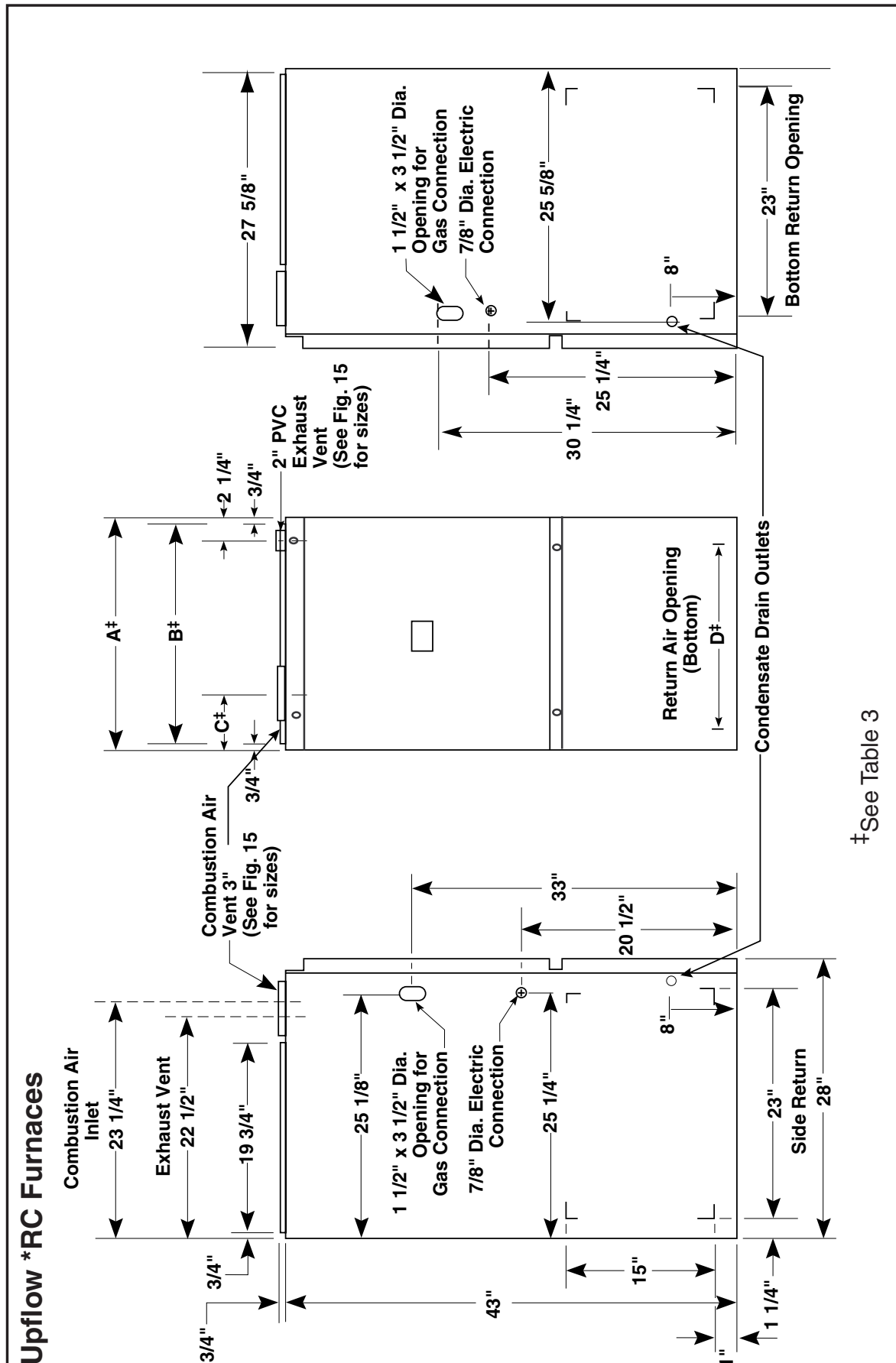


Figure 1. Upflow Unit Dimensions

Technical drawing of a 43" wide furnace, showing front, side, and top views with dimensions and labels.

**Front View Dimensions:**

- Overall Width: 43"
- Base Height: 1"
- Combustion Air Inlet: 24 7/8"
- Exhaust Vent: 22 1/2"
- Gas Connection Opening: 21 7/8"
- Gas Connection: 1 1/2" x 3 1/2" Dia.
- Condensate Drain Outlet: 10 1/4"
- Bottom Opening: 19 3/4"
- Condensate Drain Outlet: 3/4"

**Side View Dimensions:**

- Overall Depth: 27 7/8"
- Gas Connection Opening: 15 1/2"
- Exhaust Vent: 21 1/2"
- Bottom Supply Air Opening: D

**Top View Dimensions:**

- Overall Width: 24 7/8"
- Gas Connection Opening: 21 7/8"
- Condensate Drain Outlet: 10 1/4"
- Bottom Opening: 19 3/4"
- Condensate Drain Outlet: 3/4"

**Labels:**

- Combustion Air Inlet
- Exhaust Vent
- Gas Connection
- Condensate Drain Outlet
- Bottom Opening

### Figure 2. Downflow Unit Dimensions

# CAPACITIES —Furnace Airflow Data

## G6RC UPFLOW FURNACE

Model Number *RC-	Heating Input (Btuh)	Motor Speed	Motor HP	External Static Pressure (Inches Water Column)											
				0.1		0.2		0.3		0.4		0.5		0.6	
				CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise
040( )-08A	40,000	High* Medium** Low	1/5	950	36	920	38	890	39	850	41	800	43	750	46
				740	47	710	49	680	51	650	53	600	58	550	63
				620	56	590	59	560	62	520	-	470	-	410	-
040( )-12A	40,000	High* Medium** Low	1/3	1330	-	1280	-	1230	-	1170	-	1120	-	1030	-
				1190	-	1160	-	1110	-	1060	-	1010	-	910	-
				830	42	810	43	780	44	760	46	720	48	670	52
060( )-12A	60,000	High* Medium** Low	1/3	1310	-	1260	-	1210	-	1160	45	1100	47	1040	50
				1160	45	1120	46	1080	48	1050	52	990	55	940	58
				800	65	780	67	760	68	740	70	710	73	680	75
080( )-12B	80,000	High* Med-High** Med-Low Low	1/2	1775	38	1724	39	1652	40	1583	42	1505	44	1430	46
				1417	47	1385	48	1339	50	1280	52	1224	54	1163	57
				1031	65	987	67	967	69	914	73	882	75	839	-
				808	-	751	-	717	-	679	-	641	-	595	-
080( )-16B	80,000	High* Med-High** Med-Low Low	1/2	1840	-	1780	-	1700	41	1630	42	1550	45	1470	47
				1600	43	1560	44	1470	47	1400	49	1350	51	1280	54
				1380	50	1350	51	1300	53	1250	55	1190	58	1120	62
				1100	63	1050	66	1000	69	950	-	900	-	850	-
080( )-20B	80,000	High* Med-High** Med-Low Low	3/4	2215	30	2155	31	2090	32	2030	33	1975	34	1885	35
				2000	33	1970	34	1930	35	1870	36	1820	37	1755	38
				1670	39	1665	40	1660	41	1630	41	1590	42	1535	43
				1365	48	1360	49	1350	49	1340	50	1305	51	1300	51
100( )-16B	100,000	High* Med-High** Med-Low Low	1/2	1910	45	1860	47	1780	49	1700	51	1620	53	1520	57
				1640	53	1620	53	1540	56	1480	58	1420	61	1340	65
				1440	60	1410	61	1370	63	1320	66	1270	68	1210	72
				1230	70	1210	72	1180	73	1140	-	1090	-	1030	-
100( )-20B	100,000	High* Med-High** Med-Low Low	3/4	2195	39	2140	40	2065	41	2000	42	1960	44	1860	46
				1975	43	1910	44	1875	45	1845	46	1805	47	1735	50
				1650	51	1615	52	1605	53	1570	54	1540	55	1485	57
				1320	64	1300	65	1280	66	1275	67	1265	68	1250	68
120( )-16C	120,000	High* Med-High** Med-Low Low	1/2	1860	56	1800	58	1730	60	1650	63	1570	66	1480	70
				1650	63	1610	65	1550	67	1480	70	1410	74	1320	79
				1440	72	1410	74	1380	75	1320	79	1280	81	1220	85
				1230	84	1210	-	1180	-	1140	-	1090	-	1030	-
120( )-20C	120,000	High* Med-High** Med-Low Low	3/4	2260	-	2200	-	2140	-	2070	-	1990	-	1910	-
				1870	56	1840	56	1790	58	1760	59	1710	61	1660	63
				1540	67	1530	68	1510	69	1470	71	1430	73	1370	76
				1360	76	1330	78	1310	79	1280	81	1250	83	1220	85

Table 1. Furnace Airflow Data

( ) Can be C or N

\* Factory Set Cooling Speed

\*\* Factory Set Heating Speed

- Not Recommended

NOTES: 1. Airflow rates of 1800 CFM or more require two return air connections. Data is for operation with filter(s).

2. Temperature rises in the table are approximate. Actual temperature rises may vary.

3. Temperature rises and airflows for external static pressures greater than 0.5 are for reference only.

These conditions are not recommended.

## CAPACITIES —Furnace Airflow Data continued

Model Number *RL-	Heating Input (Btuh)	Motor Speed	Motor HP	External Static Pressure (Inches Water Column)															
				0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
				CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise
040()-12	40,000	High*	1/3	1280	-	1210	-	1180	-	1140	-	1090	-	1070	-	1030	-	990	-
		Medium		1140	-	1090	-	1060	-	1030	-	980	35	950	36	910	37	870	39
		Low**		875	39	835	41	820	41	805	42	780	43	770	44	760	45	750	45
060()-12	60,000	High*	1/3	1260	40	1190	43	1155	44	1120	45	1075	47	1030	49	980	52	940	54
		Medium**		1120	45	1070	48	1040	49	1010	50	960	53	930	55	890	57	850	60
		Low		855	59	815	62	800	64	780	65	760	67	730	70	710	-	690	-
080()-16	80,000	High*	1/2	1635	-	1585	-	1525	-	1460	46	1400	48	1330	51	1260	54	1180	57
		Med-High**		1435	47	1395	49	1350	50	1300	52	1255	54	1200	56	1150	59	1090	62
		Med-Low		1230	55	1200	56	1165	58	1130	60	1090	62	1050	65	1000	68	960	71
100()-16	100,000	Low	1/2	1050	-	1035	-	1010	-	980	-	950	-	910	-	870	-	820	-
		High*		1600	53	1555	54	1500	56	1445	59	1380	61	1310	65	1240	68	1160	73
		Med-High**		1475	57	1435	59	1385	61	1335	63	1290	66	1240	68	1190	71	1130	75
120()-20	100,000	Med-Low	3/4	1320	-	1290	-	1250	-	1215	-	1170	-	1120	-	1070	-	1020	-
		Low		1150	-	1130	-	1110	-	1075	-	1040	-	1000	-	950	-	890	-
		High*		2085	48	2035	49	1965	51	1910	52	1840	54	1780	56	1715	58	1630	61
120()-20	100,000	Med-High**	3/4	1925	52	1885	53	1835	55	1780	56	1730	58	1675	60	1615	62	1540	65
		Med-Low		1720	58	1670	60	1630	61	1610	63	1570	64	1510	66	1465	68	1415	72
		Low		1500	66	1495	69	1460	66	1430	70	1400	72	1365	73	1315	-	1265	-

## SAFETY INFORMATION

1. Use only with type of gas approved for this furnace. Refer to the furnace rating plate.
2. Install this furnace only in a location and position as specified on Table 4 of these instructions.
3. Provide adequate combustion and ventilation air to the furnace space as specified on Pages 13 through 16.
4. Provide adequate clearances around the vent air intake terminal(s) as specified on Figures 18 through 23 of these instructions.
5. Combustion products must be discharged outdoors. Connect this furnace to an approved vent system only, as specified on Pages 16 through 26.
6. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified on Page 28 of these instructions.
7. Always install furnace to operate within the furnace's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified on Table 2 of these instructions. See furnace rating plate.
8. When a furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by duct(s) sealed to the furnace casing and terminating outside the space containing the furnace.
9. A gas-fired furnace for installation in a residential garage must be installed as specified on Page 10 of these instructions.
10. The furnace is not to be used for temporary heating of buildings or structures under construction.

## INSTALLATION REQUIREMENTS

### Requirements and Codes

This furnace must be installed in accordance with these instructions, all applicable local building codes, and the current revision of the National Fuel Gas Code (ANSI-Z223.1, NFPA-54). The current revision of the National Fuel Gas Code is available from:

American National Standards Institute, Inc.  
1430 Broadway

New York, New York 10018

Canada installations shall comply with CAN/CGA-B149 installation codes, local plumbing or waste water codes and other applicable codes.

Additional helpful publications are:

- NFPA-90A - Installation of Air Conditioning and Ventilating Systems.
- NFPA-90B - Warm Air Heating and Air Conditioning Systems.

These publications are available from:

National Fire Protection Association, Inc.  
Batterymarch Park  
Quincy, Massachusetts 02269



## WARNING:

**This furnace is not approved for installation in mobile homes. Installation in a mobile home could cause fire, property damage, and/or personal injury.**

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## IMPORTANT NOTE

The Commonwealth of Massachusetts requires compliance with regulation 248 CMR 4.00 and 5.00 for installation of through – the – wall vented gas appliances as follows:

- (a) For direct-vent appliances, mechanical-vent heating appliances or domestic hot water equipment, where the bottom of the vent terminal and the air intake is installed below four feet above grade the following requirements must be satisfied:

1. If there is not one already present, on each floor level where there are bedroom(s), a carbon monoxide detector and alarm shall be placed in the living area outside the bedroom(s). The carbon monoxide detector shall comply with NFPA 720 (2005 Edition).
2. A carbon monoxide detector shall be located in the room that houses the appliance or equipment and shall:
  - a. Be powered by the same electrical circuit as the appliance or equipment such that only one service switch



Model Number	Furnace Btuh	Dimensions (inches)				Shipping Weight (lbs)
		A	B	C	D	
*RC040	40,000	14 1/4	12 3/4	5 1/8	11 3/4	133
*RC060	60,000	14 1/4	12 3/4	5 1/8	11 3/4	140
*RC080	80,000	19 3/4	18 1/4	7 7/8	17 1/4	172
*RC100	100,000	19 3/4	18 1/4	7 7/8	17 1/4	180
*RC120	120,000	22 1/2	21	9 1/4	20	204
*RL040	40,000	14 1/4	12 3/4	4 5/8	12 3/4	135
*RL060	60,000	14 1/4	12 3/4	4 5/8	12 3/4	135
*RL080	80,000	19 3/4	18 1/4	10	18 1/4	174
*RL100	100,000	19 3/4	18 1/4	10	18 1/4	185
*RL120	120,000	22 1/2	21	12 1/2	21 1/8	209

**Table 3. Furnace Dimensions and Shipping Weights**

## CLEARANCES TO COMBUSTIBLE MATERIALS

This furnace is Designed Certified by CSA International for the minimum clearances to combustible material listed in Table 4. See the furnace name plate, located inside the furnace cabinet, for specific model number and clearance information.

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIAL						
Furnace Input (Btuh)	Cabinet Width (Inches)	Minimum Clearances (Inches)				
		Side	Vent	Back	Top	Front
40,000	14 1/4	0	0	0	1	1*
60,000	14 1/4	0	0	0	1	1*
80,000	14 1/4	0	0	0	1	1*
100,000	19 3/4	0	0	0	1	1*
120,000	22 1/2	0	0	0	1	1*

\* When installed horizontally, 24 inches is required for servicing.

**Table 4. Minimum Clearances to Combustible Materials**

- services both the appliance and the carbon monoxide detector;
  - b. Have battery back-up power;
  - c. Meet ANSI/UL 2034 Standards and comply with NFPA 720 (2005 Edition);and
  - d. Have been approved and listed by a Nationally Recognized Testing Laboratory as recognized under 527 CMR.
3. A Product-approved vent terminal must be used, and if applicable, a Product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the appliance or equipment at the completion of the installation.
  4. A metal or plastic identification plate shall be mounted at the exterior of the building, four feet directly above the location of vent terminal. The plate shall be of sufficient size to be easily read from a distance of eight feet away, and read "Gas Vent Directly Below".

(b) For direct-vent appliances, mechanical-vent heating appliances or domestic hot water equipment where the bottom of the vent terminal and the air intake is installed above four feet above grade the following requirements must be satisfied:

1. If there is not one already present, on each floor level where there are bedroom(s), a carbon monoxide detector and alarm shall be placed in the living area outside the bedroom(s). The carbon monoxide detector shall comply with NFPA 720 (2005 Edition).
2. A carbon monoxide detector shall:
  - a. Be located in the room that houses the appliance or equipment;
  - b. Be either hard-wired or battery powered or both; and
  - c. Shall comply with NFPA 720 (2005 Edition).
3. A Product-approved vent terminal must be used, and if applicable, a Product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the appliance or equipment at the completion of the installation.

## Location

The furnace must be installed on a level surface, and as close to the center of the air distribution system as possible. See Table 3 for overall dimensions to determine the required clearances in hallways, doorways, stairs, etc. to allow the furnace to be moved to the installation point. The furnace must be installed so that all electrical components are protected from water.

Minimum clearances to combustible materials are listed in Table 4. Access for positioning and servicing must be considered when locating the unit. Twenty four inches is the minimum required clearance for servicing the unit. Thirty inches is the minimum required clearance for positioning the unit. Thirty six inches is the recommended clearance from the front of the unit. Please note that a panel or door can be located such that the minimum clearance on the rating plate is satisfied, but that panel or door must be removable and allow the appropriate clearance for your installation.

This furnace is certified for use on wood flooring. The furnace must be installed on a solid surface and must be level front to back and side to side. This furnace must not be installed directly on carpeting, tile, or any combustible material other than wood flooring.

## DOWNFLOW WARNING

### (\*RL Models):

The design of the downflow furnace is certified for natural or propane gas and for installation on non-combustible flooring. A special combustible floor sub-base is required when installing on a combustible floor. Failure to install the sub-base may result in fire, property damage and personal injury. The special downflow sub-bases are factory supplied accessories, part number 902974, 902677, 904108 and 904165. Part #904108 is an adjustable sub-base kit and it can be used on all cabinet sizes. When the furnace is installed on a factory or site-built cased air conditioning coil, the sub-base is not necessary. However, the plenum attached to the coil casing must be installed such that its surfaces are at least 1" from combustible construction.

A gas-fired furnace installed in a residential garage must be installed so that the burners and the ignition source are located a minimum of 18" from the floor. The furnace must be located or protected to avoid physical damage by vehicles.

## HORIZONTAL INSTALLATIONS

The upflow model furnaces are approved for horizontal installation. Installation Kit #903568 is available for horizontal applications. The parts may also be field supplied. NOTE: Downflow models are NOT approved for horizontal installation.



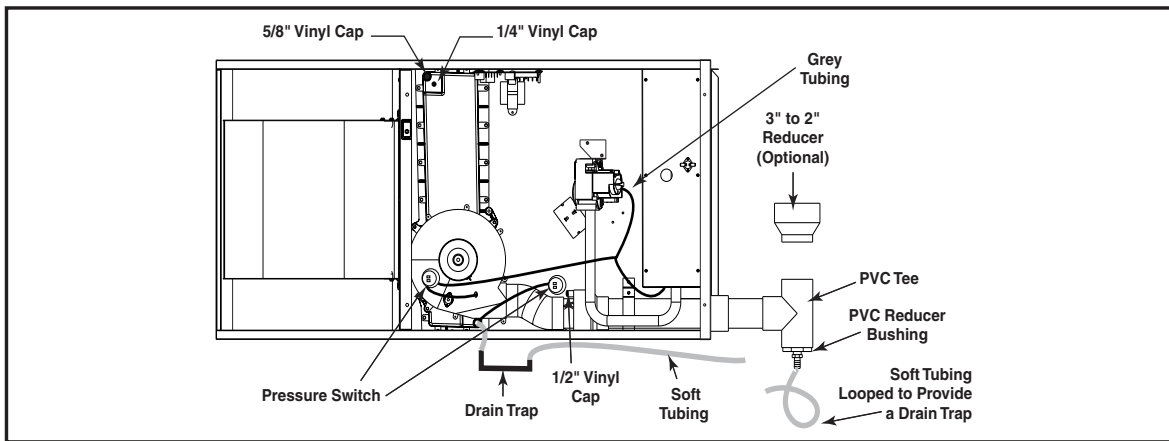
## CAUTION:

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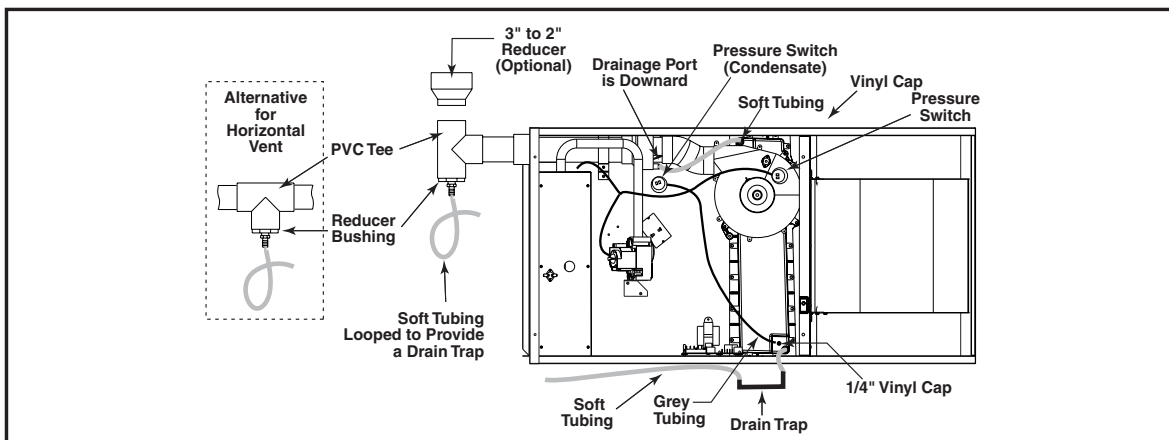
**Damage to the product resulting from failure to follow instructions or use of unauthorized parts may void the manufacturer's product warranty coverage.**

---

The 90+ upflow furnace can be installed horizontally in an attic, basement, crawl space or alcove. This furnace can be installed horizontally to the clearances listed in Table 4 on a platform



**Figure 3. 90+ Upflow Converted for Horizontal Installation (Horizontal Right)**



**Figure 4. 90+ Upflow Converted for Horizontal Installation (Horizontal Left)**

or on the ceiling rafters. Note that the platform and the ceiling rafters must be able to support the weight of the furnace being installed. It can also be suspended from a ceiling in a basement or utility room in either a right to left airflow or left to right airflow.

When installed horizontally, the furnace must be raised above the surface to allow a drain trap to hang vertically below the furnace. This will allow for proper drainage of the condensate from the furnace.

#### **Conversion of the 90+ Upflow Furnace for a Horizontal Right Installation.**

1. Remove the hard "J" tube drain trap assembly.
2. Place the 5/8" cap plug over the drain tap in the header box from which the "J" drain trap assembly was removed.
3. Remove the piece of soft tubing running from the in-line drain assembly to the header box and place a 1/2" vinyl cap over the drain tap in the in-line drain assembly.

4. Remove the grey tubing from the pressure switch to the header box. Remove the 1/4" cap from the pressure tap on the right side of the header box and place it on the corresponding pressure tap on the opposite side of the header box.

#### **Conversion of the 90+ Upflow Furnace for a Horizontal Left Installation.**

Refer to Figure 4 for details and description of parts required for the horizontal left conversion.

1. Remove the hard "J" tube drain trap assembly.
2. Ensure that the piece of soft tubing running from the in-line drain assembly to the header box is in place with the drain oriented downwards (See Figure 4).
3. Connect a draw trap to the right side of the header on the furnace. The drain trap must be installed according to local code. **NOTE:** A downward slope must be maintained on the tube as it is routed through the furnace (when the furnace is in the horizontal position).

**NOTE:** To avoid condensate freezing in the drain trap assembly and tubing, insulate around the drain trap assembly and all tubing located in unconditioned space.

---

**NOTE:** When converting the furnace, to horizontal left, ensure that the drainage port on the in-line drain assembly is downward as shown in Figure 4. If the in-line drain assembly is not rotated, then the furnace may not drain properly.

---

## SUPPLY AIR PLENUM INSTALLATION

### A. Installation on a concrete slab - \*RL

1. Construct a hole in the floor per the dimensions in Figure 5.
2. Place the plenum and the furnace as shown in Figure 6.

### B. Installation on a combustible floor - \*RL

1. Cut hole and frame the hole per the dimensions in Figure 7.
2. Place sub-base for combustible floors over the hole with its duct collar extended downward. Attach the supply air plenum to the base in a manner which will assure 1" clearance to the flooring or other combustible material. Place furnace on the combustible base as shown in Figure 8.
3. When the furnace is installed on a factory or site-built cased air conditioning coil, the sub-base is not necessary. However, the plenum attached to the coil casing must be installed such that its surfaces are at least 1" from combustible material in Figure 9.

## CIRCULATING AIR SUPPLY

Plenums and air ducts must be installed in accordance with the Standard for the Installation of Air Conditioning and Ventilating Systems (NFPA No. 90A) or the Standard for the Installation of Warm Air Heating and Air Conditioning Systems (NFPA No. 90B).

If outside air is utilized as return air to the furnace for ventilation or to improve indoor air quality, the system must be designed so that the return air to the furnace is not less than 50°F (10°C) during heating operation. If a combination of indoor and outdoor air is used, the ducts and damper system must be designed so that the return air supply to the furnace is equal to the return air supply under normal, indoor return air applications.

When a cooling system is installed which uses the furnace blower to provide airflow over the indoor coil, the coil must be installed downstream (on the outlet side) or in parallel with the furnace.

If a cooling system is installed in parallel with the furnace, a damper must be installed to prevent chilled air from entering the furnace and condensing on the heat exchanger. If a manually operated damper is installed, it must be designed so that operation of the furnace is prevented when the damper is in the cooling position and operation of the cooling system is prevented when the damper is in the heating position.



## WARNING:

---

**Products of combustion must not be allowed to enter the return air ductwork or the circulating air supply. Failure to prevent products of combustion from being circulated into the living space can create potentially hazardous conditions including carbon monoxide poisoning that could result in personal injury or death.**

**All return ductwork must be secured to the furnace with sheet metal screws. For installations in confined spaces, all return ductwork must be adequately sealed and joints must be taped. When return air is provided through the bottom of the furnace, the joint between the furnace and the return air plenum must be sealed.**

**The floor or platform on which the furnace is mounted must provide sound physical support of the furnace with no gaps, cracks, or sagging between the furnace and the floor or platform.**

**Return air and circulating air ductwork must not be connected to any other heat producing device such as a fire-place insert, stove, etc.**

---

## Return Air

The return air ductwork may be connected to any or all of the following: left side return, right side return, or bottom return. Tables 1 and 2 show the airflow data for each furnace model. **Where maximum airflow is 1800 CFM or more two openings must be used.**

## VENTING AND COMBUSTION AIR REQUIREMENTS

NORDYNE condensing furnaces may be installed with outdoor combustion air piped directly to the furnace, or without such special piping. Codes refer to the former as “direct vent” or “two pipe” installation. Installation with air taken from around the furnace is sometimes referred to as “one pipe” installation where only the vent (exhaust) pipe is provided.

Provisions must be made for adequate supply of air for combustion and ventilation. For United States installations, the adequacy of air provisions can be determined by consulting the current version of the National Fuel Gas Code (ANSI Z223.1/NPFA-54). For Canadian installations, requirements are specified in the National Standard of Canada (CAN/CGA B149.1 & .2). Consult local codes for special requirements.

An important consideration in selecting one or two pipe installation is the quality of the combustion air. Indoor air is sometimes contaminated with various household chemicals which can cause severe corrosion in the furnace combustion system.

NOTE: If the furnace is operated without adequate air for combustion and ventilation, it may not perform properly. Furnace components may be strained by high temperature and could fail.



## WARNING:

Furnace installation using methods other than those described in the following sections must comply with the **National Fuel Gas Code** and all applicable local codes to provide sufficient combustion air for the furnace.

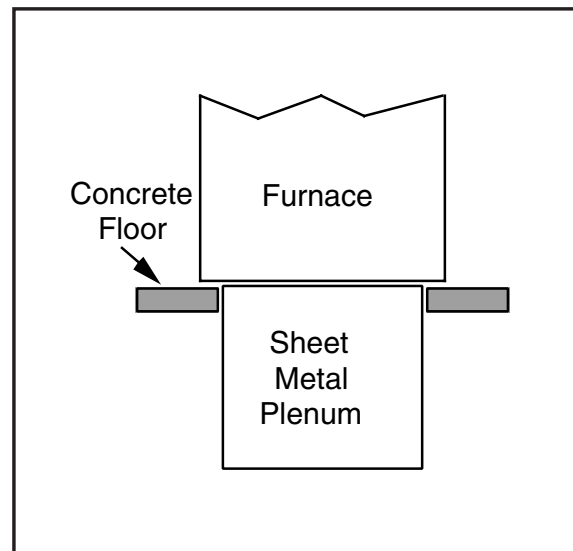


Figure 6. Furnace on a Concrete Slab

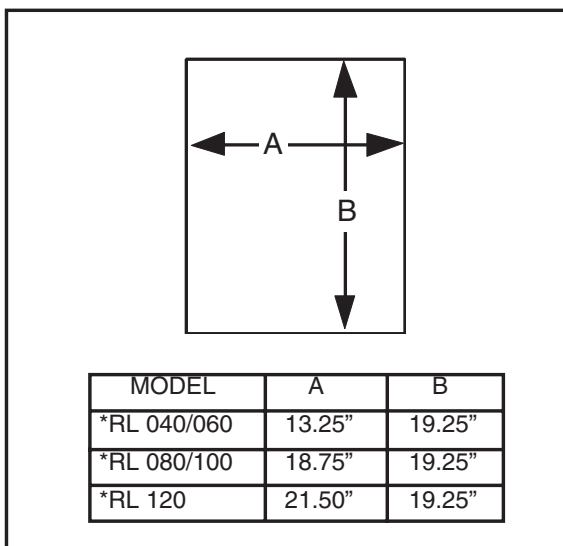


Figure 5. Opening for Concrete Slab

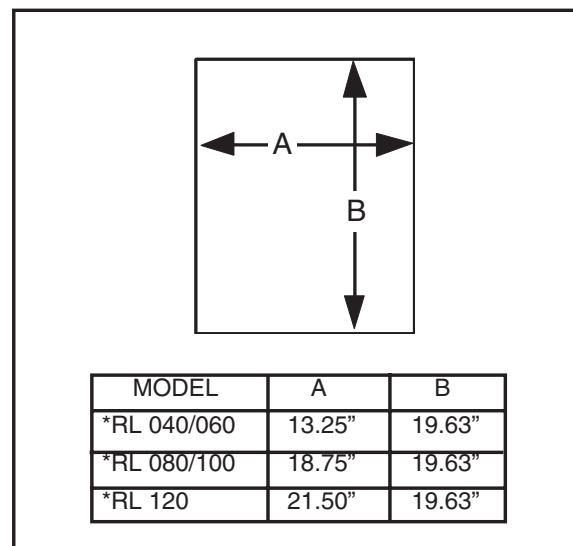


Figure 7. Opening in Wood Floor

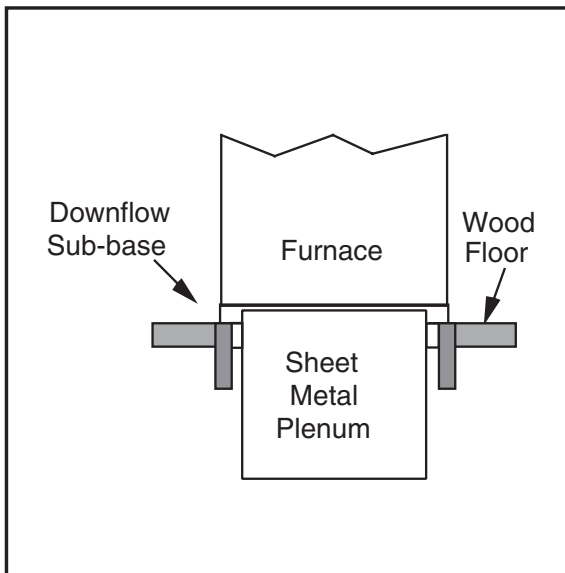


Figure 8. Furnace on a Wood Floor

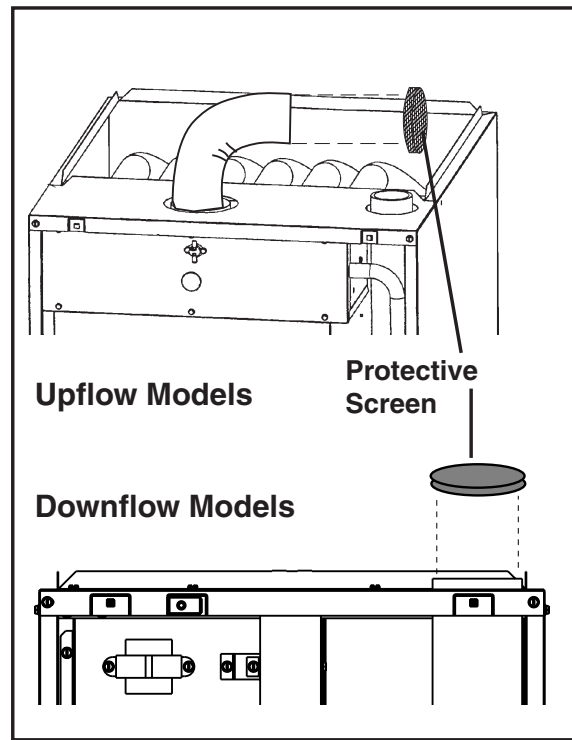


Figure 10. Protective Screen for One Pipe Installations

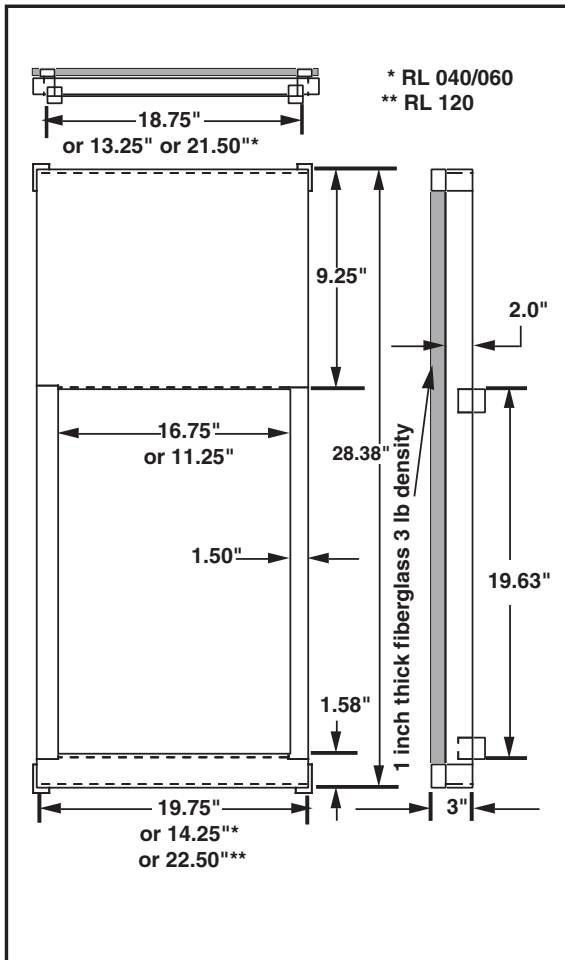


Figure 9. Downflow Sub-Base Dimensions

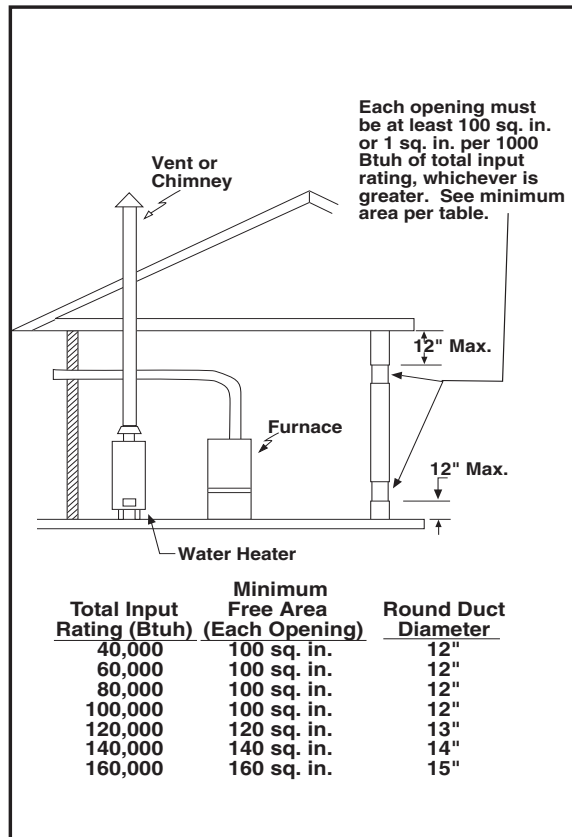


Figure 11. Equipment in a Confined Space with all Combustion Air drawn from Inside



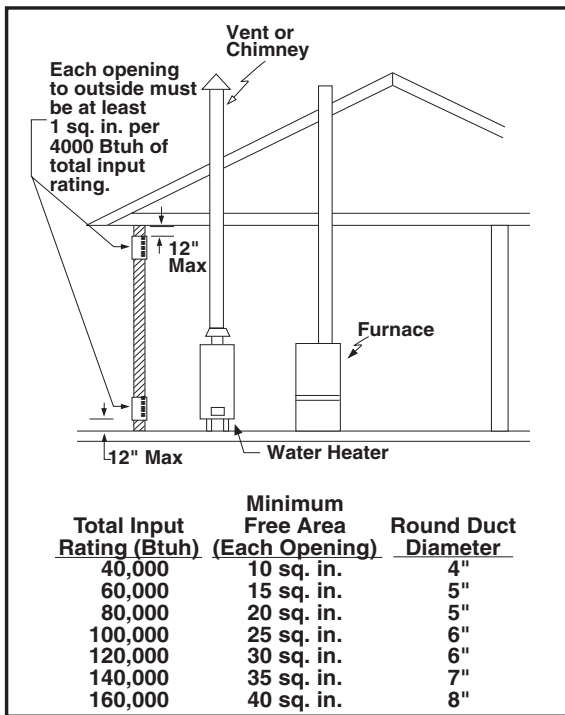


Figure 12. Equipment in a Confined Space with all Combustion Air drawn from Outdoors through Exterior Wall

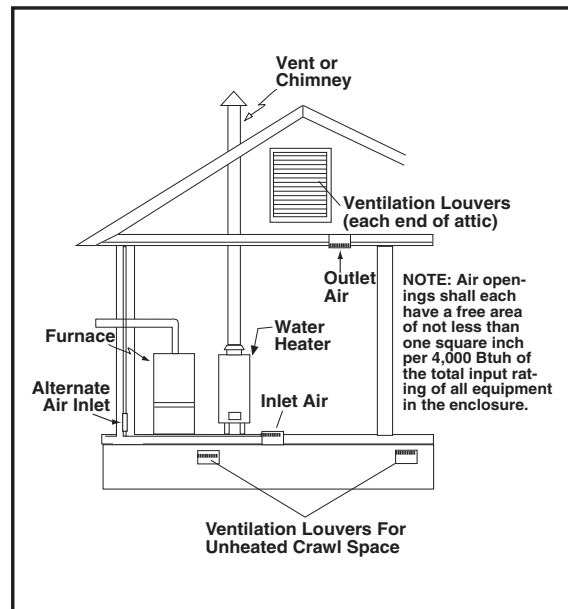


Figure 14. Equipment in a Confined Space with all Combustion Air drawn from Outdoors through Ventilated Crawl Space and Ventilated Attic

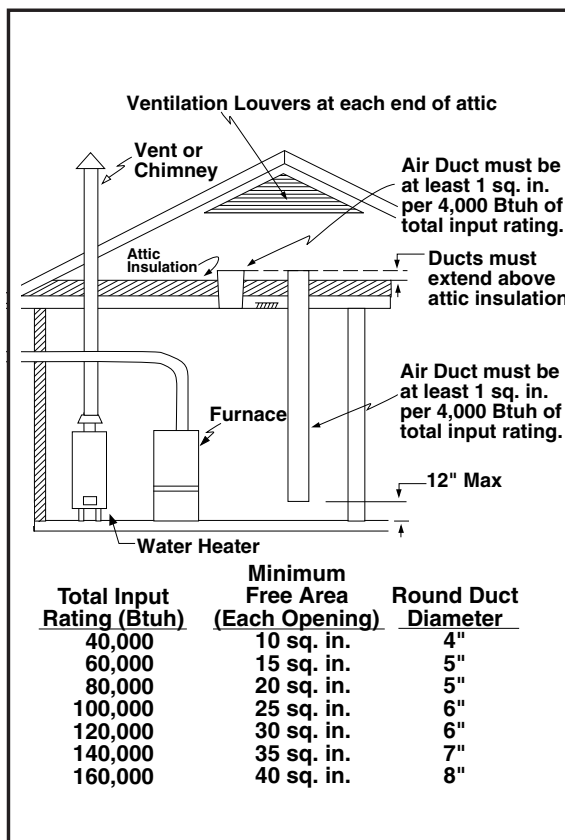


Figure 13. Equipment in a Confined Space with all Combustion Air drawn from Outdoors through Vertical Ducts – from Ventilated Attic

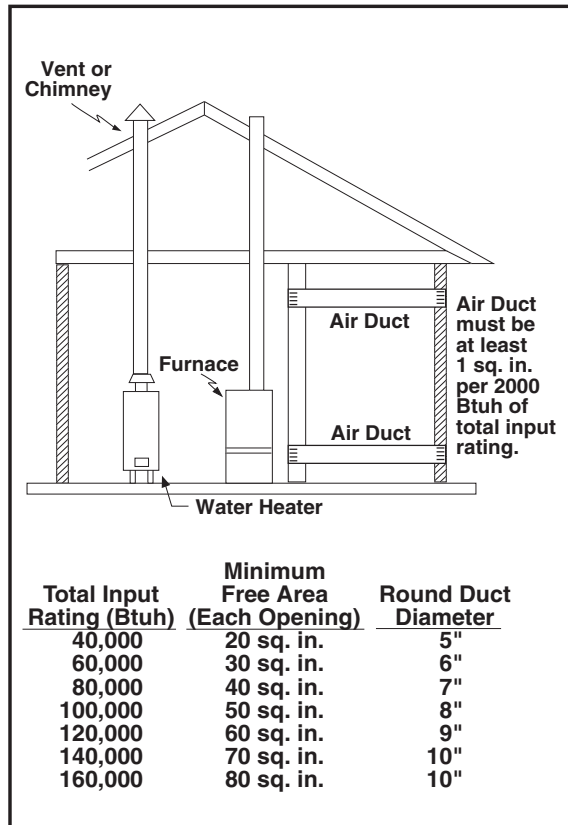


Figure 15. Equipment in a Confined Space with all Combustion Air Drawn from the Outside through Horizontal Ducts

## Combustion Air Quality

The recommended source of combustion air is to use the outdoor air supply. However, the use of indoor air in most applications is acceptable except as follows:

1. If the furnace is installed in a confined space it is recommended that the necessary combustion air come from the outdoors by way of attic, crawl space, air duct, or direct opening.
2. If outdoor combustion air is used, there must be no exposure to the installations or substances listed in Item 3 below.
3. The following types of installation may require **Outdoor Air** for combustion, due to chemical exposures:
  - Commercial buildings
  - Buildings with indoor pools
  - Furnaces installed in laundry rooms
  - Furnaces installed in hobby or craft rooms
  - Furnaces installed near chemical storage areas

Exposure to the following substances in the combustion air supply may also require **Outdoor Air** for combustion:

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

## Air Requirements For One-Pipe Installation

When air for combustion is to be taken from around the furnace, a protective screen must be installed over the combustion air intake opening. This screen is provided with the furnace installation instructions and functions to prevent debris

from entering the combustion system. It should be installed on the combustion air intake collar or inlet PVC. If furnace location is such that this opening might be unintentionally obstructed, a 3" PVC elbow must be installed on the collar, and the screen placed inside the inlet of the elbow. See Figure 10.

## Installation In An Unconfined Space



### CAUTION:

**“Tight” buildings (with weather stripping and caulk to reduce infiltration), may require special provisions for introduction of outside air to ensure satisfactory combustion and venting, even though the furnace is located in an unconfined space.**

An unconfined space is an area including all rooms not separated by doors with a volume greater than 50 cubic feet per 1,000 Btuh of the combined input rates of all appliances which draw combustion air from that space. For example, a space including a water heater rated at 45,000 Btuh and a furnace rated at 75,000 Btuh requires a volume of 6,000 cubic feet  $[50 \times (45 + 75) = 6,000]$  to be considered unconfined. If the space has an 8 foot ceiling, the floor area of the space must be 750 square feet  $(6,000 / 8 = 750)$ . In general, a furnace installed in an unconfined space will not require outside air for combustion.



### WARNING:

**Furnaces installed with combustion air drawn from a heated space which includes exhaust fans, fireplaces, or other devices that may produce a negative pressure should be considered confined space installations.**

## Installation In A Confined Space

A confined space is one which does not meet the unconfined space volume requirements, and typically involves installation in a small room. All such installations must have specific provisions for introduction of combustion and ventilation air. *Codes require that two openings be provided for this - one with bottom edge within 12" of the floor and one with top edge within 12" of the ceiling.*



The size and other criteria for these openings must be per the following sections.

Combustion air openings must not be restricted in any manner.

Furnaces installed in a confined space which supply circulating air to areas outside of the space must draw return air from outside the space and must have return air ducts tightly sealed to the furnace.

#### *Air From Inside*

Air for combustion and ventilation may be taken from inside the building through an interior wall *if the building is not "tight" and if the total volume of the furnace space and the space from which air is drawn meets the volume requirements for an unconfined space.* In such cases, the two openings in the wall must each have free area of at least one square inch per 1000 Btuh of *total* appliance input, but not less than 100 square inches of free area. See Figure 11. For example, if the combined input rate of all appliances is less than or equal to 100,000 Btuh, *each* opening must have a free area of at least 100 square inches. If the combined input rate of all appliances is 120,000 Btuh, *each* opening must have a free area of at least 120 square inches.

#### *Air Directly Through An Exterior Wall*

If combustion air is provided directly through an exterior wall, the two openings must *each* have free area of at least one square inch per 4000 Btuh of *total* appliance input. (See Figure 12.)

#### *Outdoor Air Through Vertical Openings or Ducts*

If combustion air is provided through vertical ducts or openings to attics or crawl spaces, the two openings must each have free area of at least one square inch per 4000 Btuh of total appliance input. Ducts must have cross-sectional areas at least as large as the free area of their respective openings to the furnace space. Attics or crawl spaces must communicate freely with the outdoors if they are the source of air for combustion and ventilation. (See Figures 13 and 14.)

#### *Outdoor Air Through Horizontal Openings or Ducts*

If combustion air is taken from outdoors through horizontal ducts, the openings must *each* have free area of at least one square inch per 2000 Btuh of total appliance input. Ducts must have cross-sectional area at least as large as the free area of their respective openings to the furnace space. (See Figure 15.)



## CAUTION:

**Do not supply combustion air from an attic space that is equipped with power ventilation or any other device that may produce a negative pressure.**

## VENTING REQUIREMENTS

This section specifies installation requirements for vent and "2-pipe" combustion air piping. For "one pipe" installations, install vent piping per this section and provide air for combustion and ventilation per the previous section. The capacity table provided in this section applies to the total of vent and combustion air piping for either type of installation.

NORDYNE condensing furnaces are classified as "Category IV" appliances, which require special venting materials and installation procedures. Category IV appliances operate with positive vent pressure and therefore require vent systems which are thoroughly sealed. They also produce combustion condensate, which is slightly acidic and can cause severe corrosion of ordinary venting materials. Furnace operation can be adversely affected by restrictive vent and combustion air piping. Therefore, *vent and combustion air piping lengths must conform completely to the requirements of Table 5.*

The furnace must be vented to the outdoors. It must not be vented in common with any other appliance, even if that appliance is of the condensing type. Common venting can result in severe corrosion of other appliances or their venting and can allow combustion gases to escape through such appliances or vents. Do not vent the furnace to a fireplace chimney or building chase.



## WARNING:

**FURNACE MUST NOT BE COMMON VENTED WITH OTHER APPLIANCES.**

#### *Horizontal Installations*

In order to ensure complete drainage of all condensate, an additional "T" drain assembly may be installed in line with the vent piping (see Figures 3 & 4). The "T" assembly may consist of a 2" PVC tee with a 2' to 1/2" PVC reducer bushing, and a barb fitting. These parts are available in Horizontal Vent Kit 903568, or they can be field supplied.



## WARNING:

### CARBON MONOXIDE POISONING HAZARD

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

### Vent Pipe Material

Vent and combustion air pipe and fittings must be one of the following materials and must conform to the indicated ANSI/ASTM standards:

Material	Standard
Schedule 40 PVC	D1785
PVC-DWV	D2665
SDR-21	D2241
& SDR-26	
ABS-DWV	D2661
Schedule 40 ABS	F628
Foam/Cellular Core PVC	F891

\*In Canada, all plastic vent pipe must be certified to ULC S636.

Cement and primer must conform to ATSM Standard D2564 for PVC and Standard D2235 for ABS. When joining PVC piping to ABS, use PVC solvent cement. (See procedure specified in ASTM Standard D3138.)

### Vent Pipe Length and Diameter

In order for the furnace to operate properly, the combustion air and vent piping must not be excessively restrictive. To ensure this use Table 5, which indicates the maximum allowable piping length for a furnace of specified input rate, when installed with piping of selected diameter and number of elbows. This table applies to the length and number of elbows for each pipe. To use the table, the furnace input rate, the center-line length and the number of elbows on each pipe must be known. Choose the diameter for which the tabulated length is equal to or greater than required.

Proper use of the table is illustrated by the following example:

#### Example:

An 80,000 Btu/h furnace is to be installed in a "one-pipe" system with 40 feet of vent piping. There are a total of four long radius 90-degree elbows used in the vent, including the one exterior to the building.

#### Solution:

For this particular installation, the equivalent vent length must be calculated. This equivalent vent length will then be compared to the maximum allowable vent length given in Table 5. Then, the diameter of the piping can be chosen for which the equivalent vent length is less than the maximum



allowable vent length. Returning to our example, we consult Table 5 and determine that for an 80,000 Btu/h furnace the maximum vent length for 2" diameter piping is 60 feet or for 3" diameter piping is 150 feet. Note that the maximum vent length given in Table 5 includes one long radius elbow. Therefore, for our example, we have three additional long radius elbows for which we must add to our piping. Each long radius elbow is equivalent to 2.5 feet, so we must add 7.5 feet to our vent length. Therefore, the equivalent vent length for our installation is 47.5 feet. We compare this with the maximum vent length for 2" and 3" diameter piping. For both cases, our equivalent vent length is less than the maximum allowable vent length, so for our "one-pipe" installation we can use either 2" or 3" diameter piping.

Condensing furnace combustion products have very little buoyancy, so Table 5 is to be used without consideration of any vertical rise in the piping.

NOTE: Always use the same or larger size piping for combustion air as is used for the exhaust vent.

## Vent Pipe Installation

### *Pipe Routing and Support*

Route piping as directly as possible between the furnace and the outdoors and remember that routing affects pipe size requirements per the preceding section. If a two pipe system is used, locate the combustion air intake and the vent exhaust in the same atmospheric pressure zone - i.e. both must exit the building through the same portion of exterior wall or roof (See Figure 22). Vent piping must be sloped upwards not less than 1/4" per foot in the direction from the furnace to the terminal. This is to ensure that any condensate flows back to the furnace (where it can be disposed of through the condensate disposal system).

The quality of outdoor air must also be considered. Be sure that the combustion air intake is not located near a source of solvent fumes or other chemicals which can cause corrosion of the furnace combustion system.



## CAUTION:

**Combustion air must not be drawn from a corrosive atmosphere.**

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Piping must be mechanically supported so that its weight does not bear on the furnace. Supports must be at intervals no greater than five feet, and at smaller intervals if necessary to ensure that there are no sagging sections to trap water. (See Figure 16.) It is recommended to install couplings along the vent pipe, on either side of the exterior wall. These couplings may be required by local code.

Figure 18 illustrates vent and combustion air pipe sizes exiting the furnace. Transition to the correct pipe size must be done close to the furnace so that the full length of pipe is of proper size.

Straight neoprene couplings are supplied with the downflow furnaces only. These couplings are to be installed in the combustion air inlet (if present) and exhaust vent piping at the furnace as shown in Figures 16. For an upflow furnace installation, if breakable connections are required in the combustion air inlet (if present) and exhaust vent piping, then straight neoprene couplings for 2" or 3" piping with hose clamps can be used. These couplings can be ordered through your local furnace distributor.

To install a coupling, slide the rubber coupling over the end of the pipe that is attached to the furnace and secure it with one of the hose clamps. Then slide the other end of the rubber coupling onto the other pipe from the vent and secure the coupling with the second hose clamp. Ensure that the connection is tight and leak free.

NORDYNE condensing furnaces have been certified for installation with zero clearance between vent piping and combustible surfaces. However, it is good practice to allow space for convenience in installation and service.

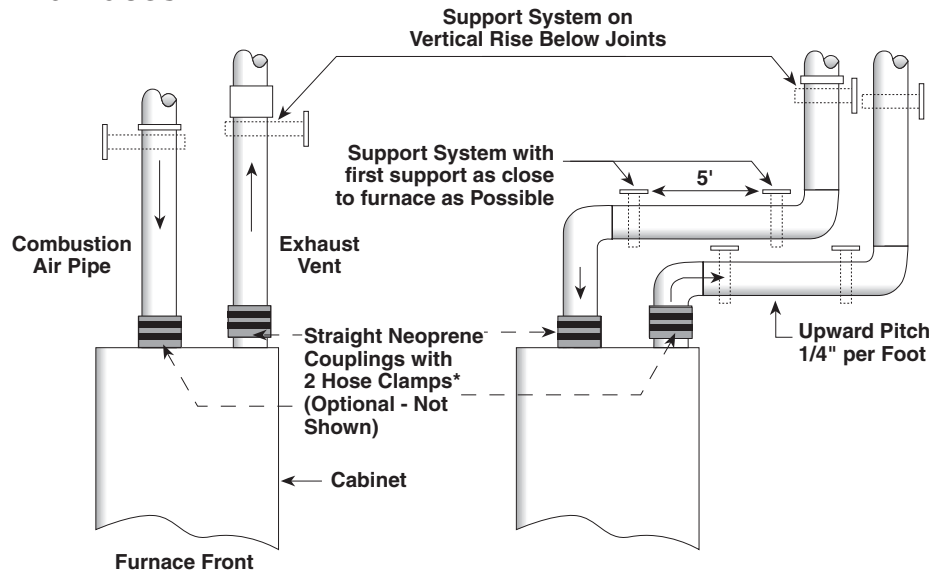
## Location of Outdoor Terminations

### *Horizontal Venting*

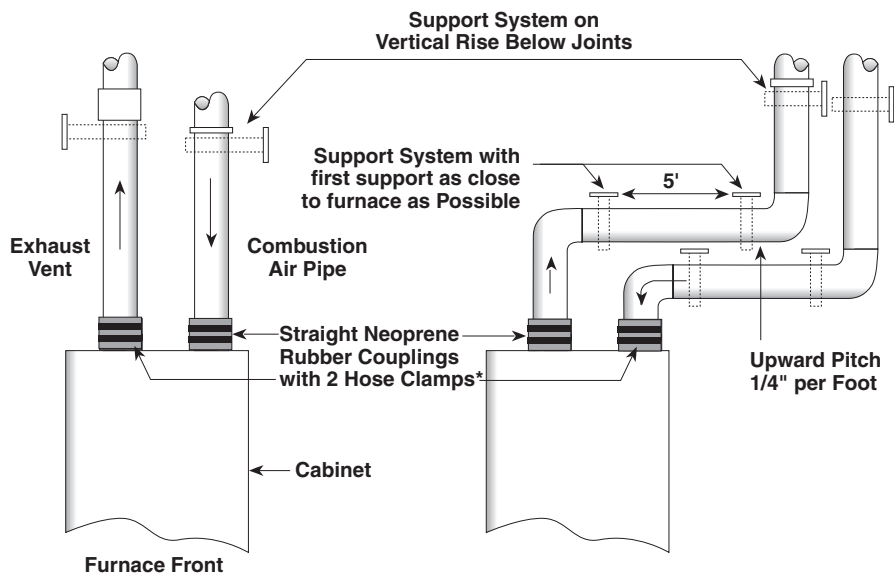
Vent and combustion air intake terminations must be as shown in Figure 19 and 20. Vent termination clearances shall be consistent with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or the CSA B149.1, Natural Gas and Propane Installation Code.

All minimum clearances specified must be maintained to protect building materials from degradation by flue gases.

## Upflow Furnaces



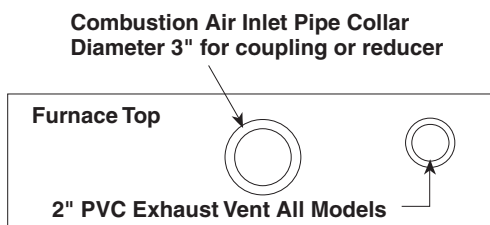
## Downflow Furnaces



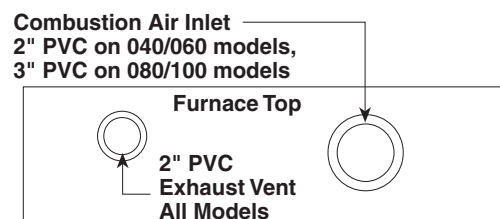
**Figure 17. Vertical Venting**

\* These couplings are field-supplied and can be used if the installation requires breakable connections in the piping. Note that a maximum of two couplings per pipe are allowed.

## Upflow Furnaces



## Downflow Furnaces



**Figure 18. Furnace Pipe Adaptions**





## WARNING:

**Ensure that the combustion air vent and the exhaust vent are configured as shown in Figure 19 and 20. Improper vent termination can cause recirculation of the flue gases. This may result in furnace vibration. In severe cases, the furnace will cycle due to the intermittent contact between the flame and the flame sensor. If you note oscillations occurring, check the vent configuration. Make sure that the exhaust vent does not have a 90 degree termination.**

Vent and combustion air intake terminations must be located to ensure proper furnace operation and to conform to applicable codes. Figure 19 and 20 illustrates necessary distances from the vent termination to windows and building air intakes. **In Canada, the Canadian Fuel Gas Code takes precedence over these instructions. Specifically, all minimum distance requirements with respect to termination of the vent piping listed below (items 1 through 8).**

The following list is a summary of vent terminal location requirements:

1. The termination must be 12 inches above snow level or grade level whichever is higher. See Figure 18 for alternate method to achieve 12" above snow level.
2. The minimum distance for a (1-pipe installation) from any door, (openable) window, or gravity air inlet is 4 ft. below, 4 ft. horizontally, or 1 ft. above.
3. The minimum distance for a direct vent (2-pipe) installation from any door, (openable) window, or air gravity inlet is 1 ft. below, 1 ft. horizontally, or 1 ft. above.
4. For one-pipe installations the recommended minimum distance from an inside corner formed by two exterior walls is 6 feet, but is not required.
5. The vent termination for a 1-pipe installation shall be a minimum of 3 ft. above any forced air inlet within 10 ft.
6. The vent termination shall be located at least 3 ft. horizontally from any electric meter, gas meter, regulator and any relief equipment in accordance to ANSI 2223.1/NFPA S4.

These distances apply ONLY to U.S. installations. In Canada, the Canadian Fuel Gas Code takes precedence.

7. Avoid areas where condensate drainage may cause problems by dropping on planters or patios, etc. Also ensure that exhaust gases will not impinge on windows or building surfaces, which may be compromised or damaged by condensation. Do not install the vent terminal such that exhaust is directed into window wells, stairwells, under decks or into alcoves or similar recessed areas, and do not terminate above any public walkways.
8. Select the point of wall penetration where the minimum 1/4 inch per foot of slope up can be maintained.



## CAUTION:

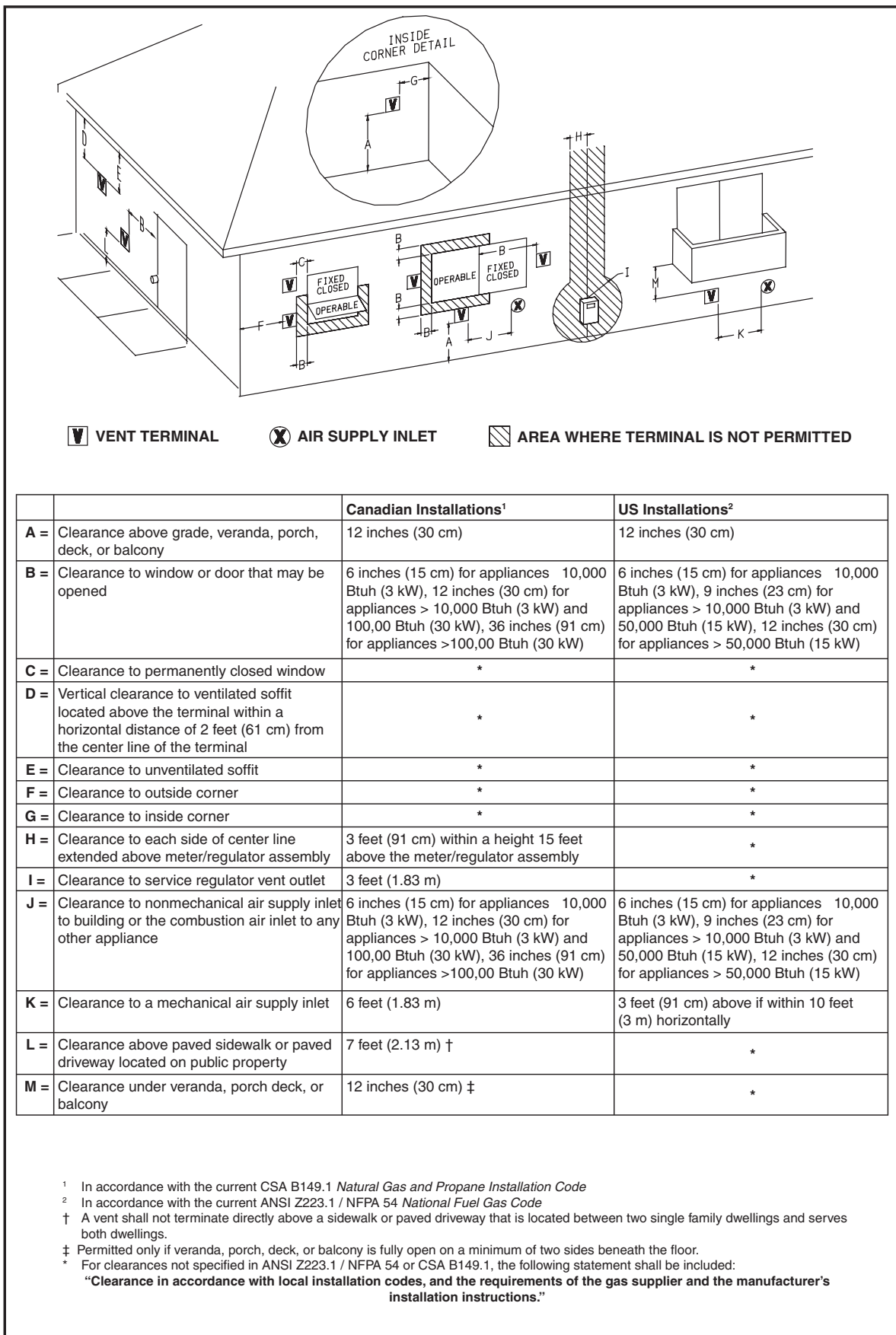
**For optimum performance, vent furnace through wall which experiences the least exposure to winter winds.**

For Canadian installations please refer to the Canadian Installation Code (CAN/CGA-B149.1 or 2) and/or local codes.

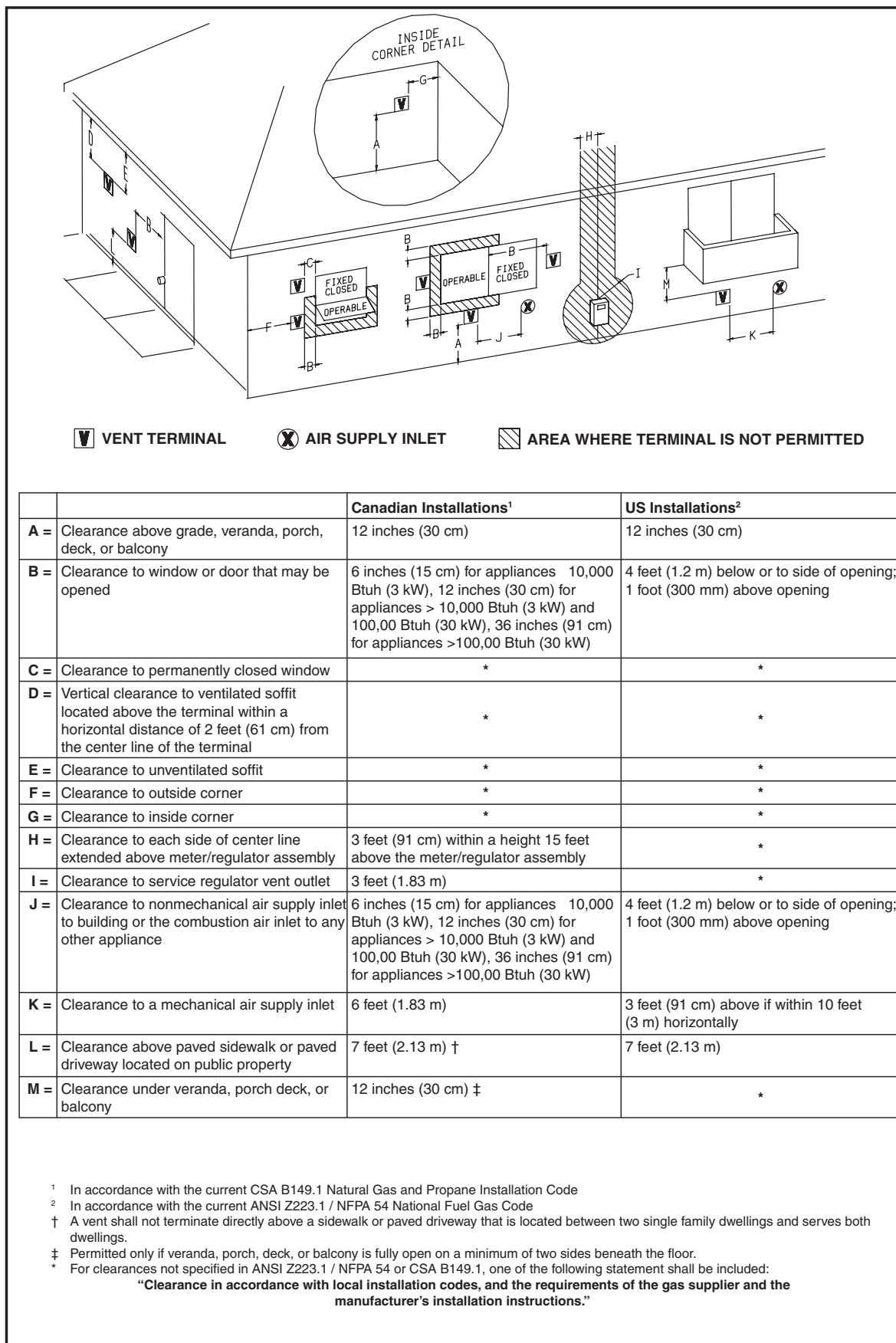
The horizontal venting kits consist of two face plates and an insulating gasket to seal the exterior surface. A hole sized closely to the pipe diameter must first be cut through the wall. A short length of pipe is then cut such that it can penetrate the wall and be held in place by closely fitting standard couplings. The face plates are retained on both sides of the wall by the couplings, and the gasket is retained against the wall by the outer face plate. Face plates must be fastened to the wall and the outside one must be flashed as appropriate to prevent entry of water.

When the horizontal kits are not used, the following steps are required:

1. Check the hole size cut through the exterior wall. Insure that the hole diameter is less than the diameter of the couplings to be used.
2. Extend the vent pipe through the wall approximately 1" and seal the area between the wall and pipe.
3. If required by local code, apply couplings to the vent pipe on the interior and exterior sides of the wall to insure the pipe can not be pushed or pulled through the wall.



**Figure 19. Vent Termination Clearances for Direct Vent Furnaces**



**Figure 20. Vent Termination Clearances for Other Than Direct Vent Furnaces**



4. Insure the combustion air inlet pipe (for a 2 pipe installation) has a 90 degree termination elbow as shown in Figures 21 and 22.

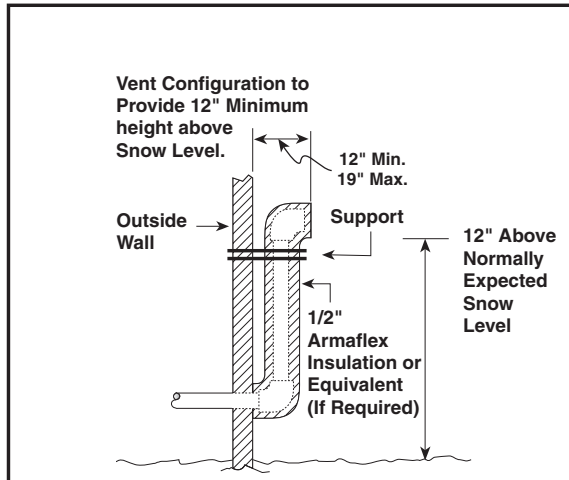
**Note:** A combustion air intake must be provided with an elbow opening downward. The screen provided with the furnace must be installed in the elbow to prevent entry of debris or creatures.

When the vent pipe must exit an exterior wall close to the grade or expected snow level, a riser should be provided as shown in Figure 20.

Table 6 describes the maximum length of flue pipe that can travel through an unconditioned space or an exterior space. The total vent length must not exceed the lengths noted on Table 5.

#### Vertical Venting

Figure 23 shows the proper installation and clearances for vertical vent termination. The roof penetration must be properly flashed and waterproofed with a plumbing roof boot or equivalent flashing. Termination spacing requirements from the roof and from each other must be per Figure 23.

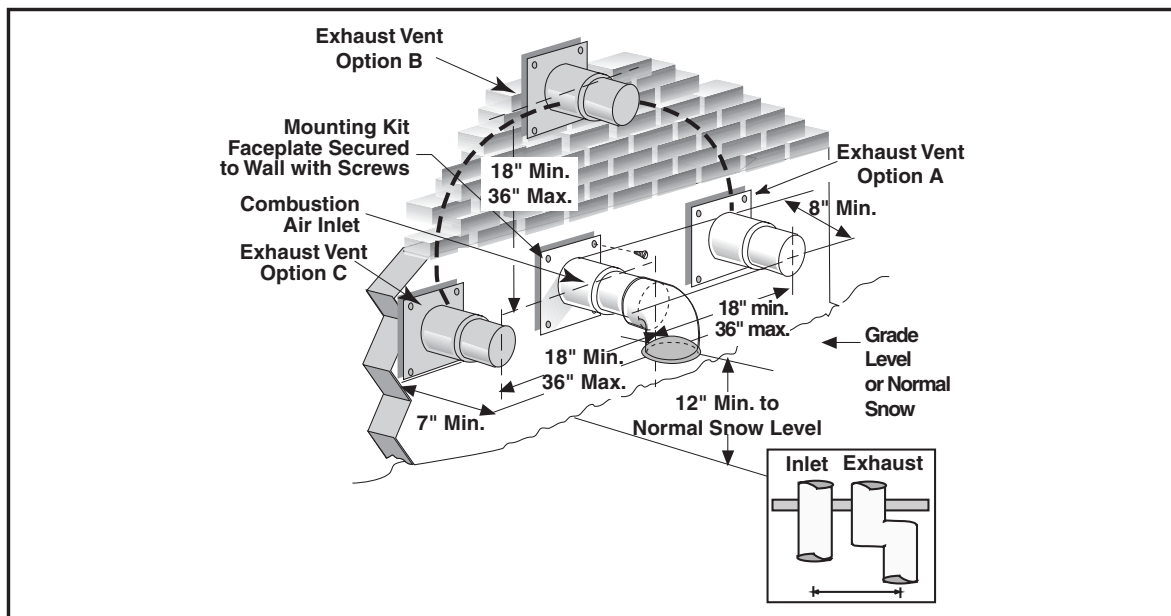


**Figure 21. Alternate Horizontal Vent Installation**

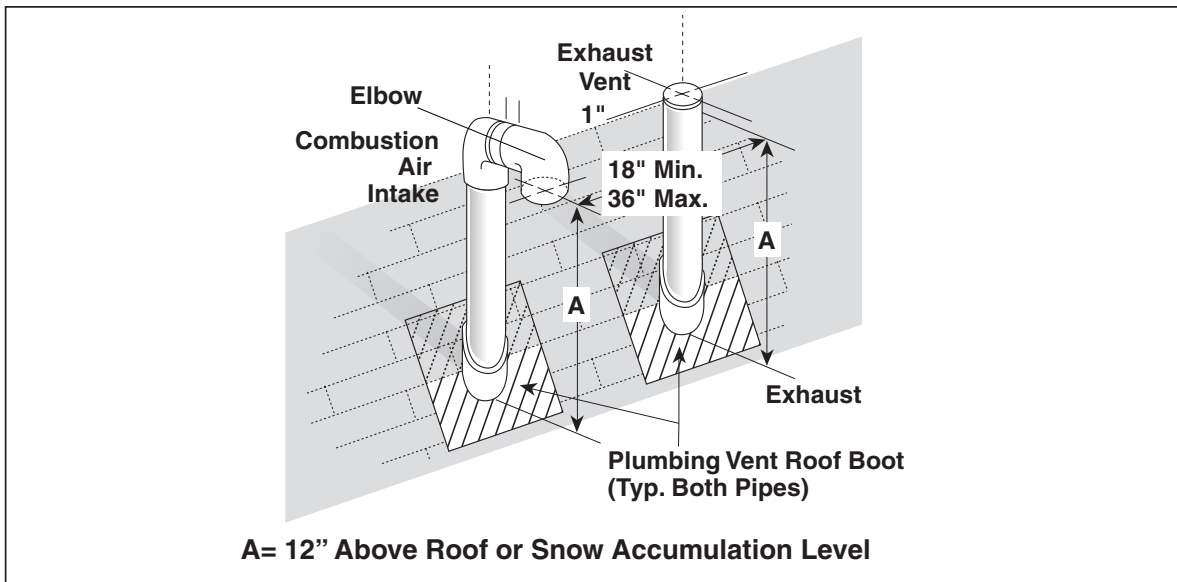
Winter Design Temperature (°F)	Maximum Flue Pipe Length in Unconditioned and Exterior Spaces	
	Without Insulation (feet)	With Insulation (feet) ‡
20	45	70
0	20	70
-20	10	60

‡ = Insulation thickness greater than 3/8 inch, based on an R value of 3.5 (ft<sup>2</sup>°F\*hr)/(BTU\*in)

**Table 6. Vent Protection**



**Figure 22. Exhaust and Combustion Air Pipe Clearances**



**Figure 23. Vertical Vent Termination**

Vent and combustion air piping may be installed in an existing chimney which is not in use provided that:

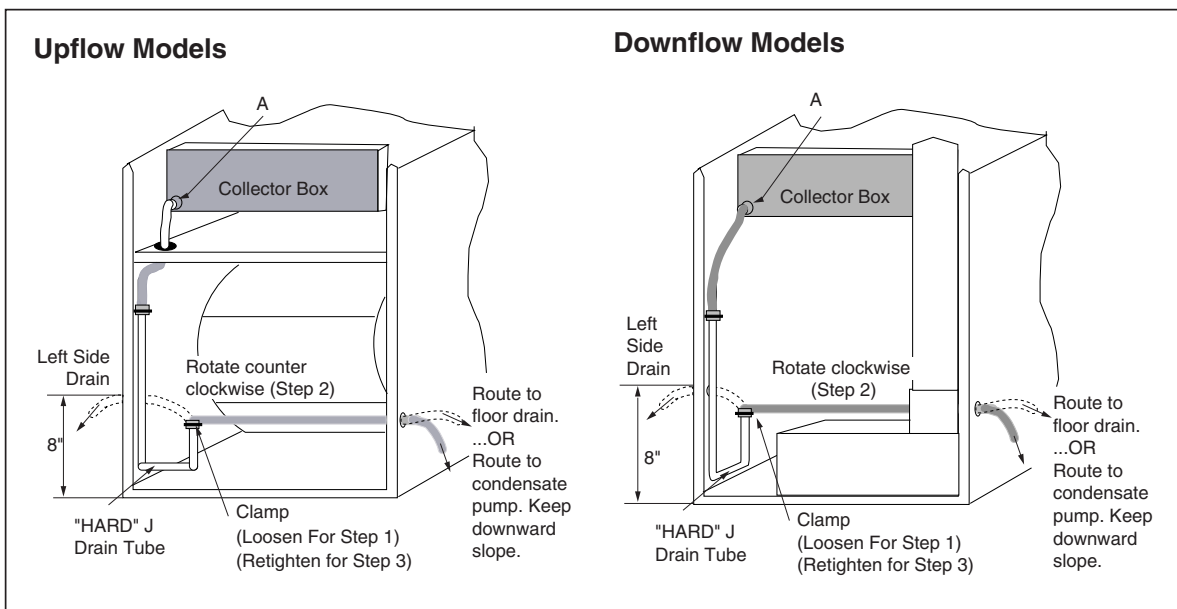
- Both the exhaust vent and air intake run the length of the chimney.
- The top of the chimney is sealed and weatherproofed.
- The termination clearances shown in Figure 23 are maintained.
- No other gas fired or fuel-burning equipment is vented through the chimney.

#### *Vent Freezing Protection*

When the vent pipe is exposed to temperatures

below freezing, i.e., when it passes through unheated spaces, chimneys, etc., the pipe must be insulated with 1/2 inch thick sponge rubber insulation, Armaflex-type insulation or equivalent. Insulating pipe is important to avoid condensate icing.

For extremely cold climates or for conditions of short furnace cycles (i.e. set back thermostat conditions) the last three feet of vent pipe can be reduced one nominal pipe size provided that the total vent length is at least 15 feet in length and the vent is sized in accordance with the venting requirements (Table 5) before this reduction is applied. (Example: 3" to 2-1/2" or 2" to 1-1/2") Smaller vent pipes are less susceptible to freezing, but must not be excessively restrictive.



**Figure 24. Furnace with Condensate Drain Trap Assembly**

### Concentric Vent Termination

Concentric vent termination kits are approved for use with these furnaces. The kit part numbers are 904176 (3 inch) and 904177 (2 inch). For proper installation of the concentric vent termination, follow the installation instructions provided with that kit.

### Side Wall Vent Kit

This side wall vent kit is approved for use with these furnaces. The kit part number is 904347, and instructions for proper installation are provided with that kit.

## DRAINAGE OF CONDENSATE FROM FURNACE

### WARNING:

**The condensate produced by the furnace must be drained. Do not connect a water supply to the drainage hose of the furnace.**

**NOTE:** The condensate drain should be protected from freezing when in unheated spaces.

The condensate drainage system is internal to the furnace. It is not recommended to connect additional traps to the exterior of the furnace. Doing so will have adverse effects on the operation of the furnace. The drain may exit either the right or left side of the furnace cabinet.

The condensate drain can be routed to a flow drain or to a condensate pump. Ensure that the drain

maintains a downward slope from the unit to the drain. Refer to Figure 24 for more details.

For a right side drain simply extend the tubing out of the 7/8" hole in the cabinet, see Figure 21. For a left side drain follow the steps below:

1. Loosen the clamp on the soft exit tube (see Figure 24.)
2. Rotate the soft exit tube (counter clockwise, 180° upflow \*RC models; clockwise 90° downflow \*RL models.)
3. Re-tighten the clamp. **MAKE SURE CLAMP IS TIGHT TO AVOID LEAKAGE OF CONDENSATE.**
4. Route the tubing out of the 7/8" hole located 8 inches up from the bottom furnace.

The condensate should drain from the plastic collector box (location A in Figure 24) as droplets or a small stream. If you notice the furnace has operated for more than 5 minutes without draining or the red status light on the control board is pulsing a 2-blink code follow the steps below.

1. Remove the collector box soft tube at location A in Figure 24 and insure the exit from the collector box is clear of any debris or obstructions.
2. Replace this tube and insure the fit to the header spout is air tight. Air will be drawn into the header if this connection is not tight.
3. Check other tube connections along the drain system. Insure that all are air tight.

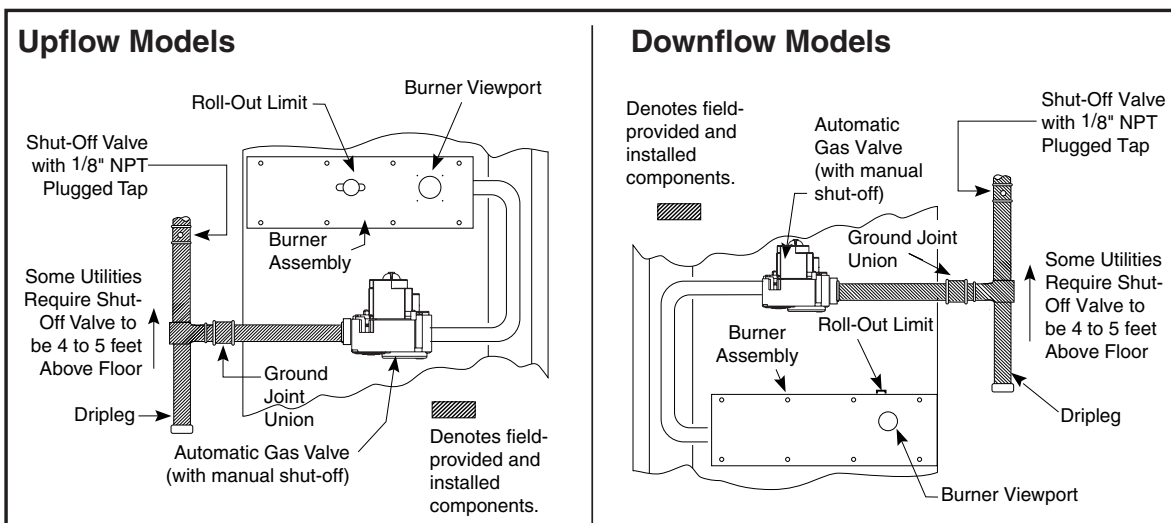


Figure 25. Typical Gas Service Connection

NOTE: Industry research studies indicate that when condensate is routed to an active drain, household detergents, etc., buffer its acidity. If the drain is not actively used or if codes require, obtain a neutralizer kit (usually contains lime-stone). Proper drains and connections to the condensate tubing are required as NORDYNE cannot be held responsible for water leakage which occurs due to loose hose connections or improperly sealed drain line pipes.

## **GAS SUPPLY AND PIPING**

This furnace is equipped for either left or right side gas entry. Typical gas service hook-ups are shown in Figure 25. When making the gas connection provide clearance between the gas supply line and the entry hole in the furnace casing to avoid unwanted noise and/or damage to the furnace.

All gas piping must be installed in compliance with local codes and utility regulations. Some local regulations require the installation of a manual main shut-off valve and ground joint union external to the furnace. The shut-off valve should be readily accessible for service and/or emergency use. Consult the local utility or gas supplier for additional requirements regarding placement of the manual main gas shut-off. In the absence of local codes the gas line installation must comply with the latest edition of the National Fuel Gas Code (ANSI Z223.1) or (CAN/CGA B149) installation codes.

An 1/8" NPT plugged tap must be installed in the gas line to the unit for use when measuring the gas supply pressure. The plug should be readily accessible for service use. A drip leg should be installed in the vertical pipe run to the unit. Table 5 lists gas flow capacities for standard pipe sizes as a function of length in typical applications based on nominal pressure drop in the line.

NOTE: Gas piping must not be run in or through air ducts, chimneys, gas vents, elevator shafts, etc.

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

The main manual gas valve and main power disconnect to the furnace must be properly labeled by the installer in case emergency shutdown is required.



## **CAUTION:**

**Do not use matches, lighters, candles, or other sources of open flame to check for gas leaks.**

---

### **Leak Check**



## **WARNING:**

**FIRE OR EXPLOSION HAZARD**  
**Failure to follow the safety warnings exactly could result in serious injury, death or property damage.**

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

---

After the gas piping to the furnace is complete, all connections must be tested for gas leaks. To check for leaks use only a soap and water solution or other approved method.

**IMPORTANT NOTE: When pressure testing gas supply lines at pressures greater than 1/2 psig (14 in. water column), the furnace must be disconnected from the gas supply piping system to prevent damage to the gas control valve. If the test pressure is less than or equal to 1/2 psig (14 in. water column), the furnace must be isolated from the gas supply line by closing the manual shut-off valve.**

---



## **WARNING:**

**This furnace was equipped at the factory for use with natural gas only. A special kit, supplied by the manufacturer, is required to convert the furnace to operate on LP/propane gas. Failure to use the proper conversion kit can cause fire, explosion, property damage, carbon monoxide poisoning, personal injury, or death.**

---

CAPACITY OF BLACK IRON GAS PIPE (CU. FT. PER HOUR) FOR NATURAL GAS (SPECIFIC GRAVITY = 0.60)								
NOMINAL BLACK IRON PIPE DIAMETER	LENGTH OF PIPE RUN (feet)							
	10	20	30	40	50	60	70	80
1/2	130	90	75	65	55	50	45	40
3/4	280	190	150	130	115	105	95	90
1	520	350	285	245	215	195	180	170
1 1/4	1050	730	590	500	440	400	370	350
1 1/2	1600	1100	890	760	670	610	560	530

The cubic feet per hour listed in the table above must be greater than the cubic feet per hour of gas flow required by the furnace. To determine the cubic feet per hour of gas flow required by the furnace, divide the input rate of the furnace by the heating value of the gas:

$$\text{Cubic Feet Per Hour Required} = \frac{\text{Input To Furnace (Btu/hr)}}{\text{Heating Value of Gas (Btu/Cu. Ft.)}}$$

**Table 7. Capacity of Black Iron Gas Pipe (cu. ft. per hour)  
for Natural Gas (specific gravity = .60)**

		ELEVATION (FEET ABOVE SEA LEVEL)				
		0-1,999	2,000-4,999	5,000-5,999	6,000-7,999	8,000-10,000
NATURAL GAS	ORIFICE SIZE	45	45	45	45	See Table 11
	MAN. PRESSURE (IN W.C.)	3.5	3.5	3.5 ‡	3.2 ‡	2.8 ‡
LP/PROPANE GAS	ORIFICE SIZE	55	55	56	56	See Table 11
	MAN. PRESSURE (IN W.C.)	10.0	8.5	10.0	9.0	8.5

‡ = Based on heating value from 900 to 999 BTUH. For heating values less than 900 BTUH multiply manifold pressure by 1.1 for corrected pressure. For heating values greater than 1,000 BTUH, multiply manifold pressure by 0.9 for corrected pressure.

**Table 8. Manifold Pressure (in WC) for Natural Gas at Various Altitudes**

Furnace Rating Plate Input (Btu/h)	Orifice Drill Size	
	Nat.	LP
40,000	45	55
60,000	45	55
80,000	45	55
100,000	45	55
120,000	45	55

**Table 10. Natural and LP Gas Orifice Sizes  
for Elevations between zero and  
4999 ft. Above Sea Level**

Furnace Rating Plate Input (Btu/h)	Orifice Drill Size	
	Nat.	LP
40,000	45	56
60,000	45	56
80,000	45	56
100,000	45	56
120,000	46	56

**Table 11. Natural and LP gas Orifice Sizes  
for Elevations between 5000 and 10,000 ft.  
Above Sea Level**

## Conversion

Conversion of this furnace to use LP/propane gas must be made by qualified service personnel, using **only** approved parts.

## High Altitude Application

High altitude application with this furnace can be field performed by a simple adjustment of manifold pressure, and if necessary changing the orifices. The changes required depend on the installation altitude and the heating value of the gas. The gas heating value based on sea level can be obtained from your local gas utility. The heating value of gas at high altitude is always lower than the sea level heating value. The heating values used in Tables 8 & 9 are based on sea level values.

## Natural Gas High Altitude Conversion

All factory shipped furnaces are ready to operate between zero and 4999 ft. above sea level. For higher altitudes (between 5000 and 10,000 ft. above sea level), conversion can be achieved simply by adjusting the furnace manifold pressure as shown in Table 8.

## LP/Propane Gas Sea Level and High Altitude Conversion

**IMPORTANT NOTE:** When converting a low

## NOx furnace from Natural gas to LP/propane gas, it is necessary to remove the NOx Baffles from the furnace.

Conversion of this furnace to utilize LP/propane gas must be made by qualified service personnel, using factory authorized or approved parts. Conversion to LP/propane gas can be accomplished by first replacing the natural gas orifices with the appropriate LP/propane orifices shown in Table 10 or 11. Note: for installations between zero and 5000 ft. above sea level, a #54 or #55 drill size orifice should be used depending upon the rated firing rate of the unit (see Table 10 or 11). However for installations above 5000 ft. above sea level, a # 55 or #56 drill size orifice should be used. After changing the orifices, use Table 9 to determine the appropriate manifold pressure for your installation.

Conversion to LP/propane, sea level, and high altitude is detailed in the installation instructions provided with the conversion kit. Approved conversion kits are listed below.

### *United States LP/Propane Gas Sea Level and High Altitude Conversion Kit - P/N 904090A*

This kit is for LP/propane conversion in the United States at altitudes between zero and 10,000 ft. above sea level. Follow the installation instructions supplied with the kit for proper installation.

Furnace Input (Btuh)	Cabinet Width (in.)	Nominal Electrical Supply	Maximum Operating Voltage	Minimum Operating Voltage	Maximum on Furnace Amperes	Minimum Wire Gauge	Maximum on Fuse or Circuit Breaker Amps*
40,000	14.25	115-60-1	127	103	7.8	14	15
60,000	14.25	115-60-1	127	103	7.8	14	15
80,000	19.75	115-60-1	127	103	9.7	14	15
100,000	19.75	115-60-1	127	103	9.7	14	15
120,000	22.50	115-60-1	127	103	12.9	12	20

\* Time-delay fuses or HACR-type circuit breakers are required.

Thermostat Wire Gauge	Recommended Maximum Thermostat Wire Length	
	2-wire (heating)	4 or 5-wire (cooling)
24	55 ft.	25 ft.
22	90 ft.	45 ft.
20	140 ft.	70 ft.
18	225 ft.	110 ft.

Table 12. Electrical Data



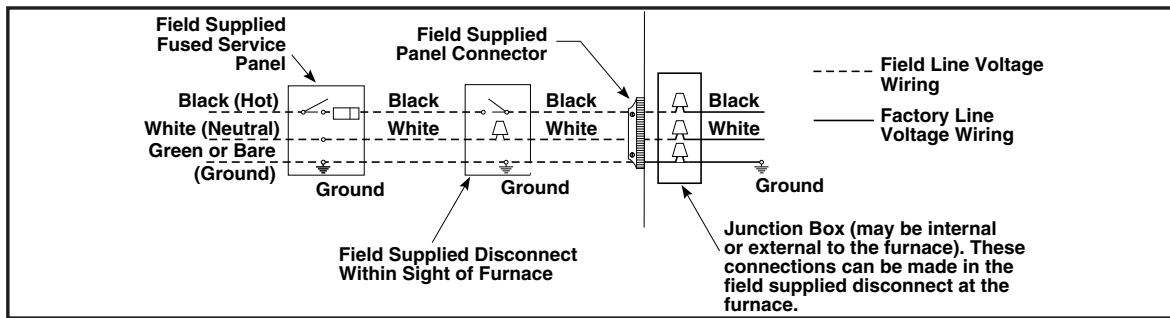


Figure 26. Line Voltage Field Wiring

### Canadian LP/Propane Gas Sea Level and High Altitude Conversion Kit - P/N 904091A

This kit is for LP/propane conversions in Canada at altitudes between zero and 4500 ft. above sea level. Follow the installation instructions supplied with the kit for proper installation.



## CAUTION:

To avoid electric shock, personal injury, or death, turn off the power at the disconnect or the main service panel before making any electrical connections.

## ELECTRICAL WIRING

Electrical connections must be made in accordance with all applicable local codes and ordinances, and with the current revision of the National Electric Code (ANSI/NFPA 70).

For Canadian installations electrical connections and grounding must be done in accordance with the current Canadian Electrical Code (CSA C22.1 Part 1) and/or local codes. If any of the original wire as supplied with the furnace must be replaced, it must be replaced with wire having a minimum temperature rating of 105°C. Refer to the furnace nameplate and Table 12 for electrical requirements.

### Line Voltage Wiring

The line voltage (115 volt) to the furnace must be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the furnace. See Table 12. An electrical switch should be readily accessible from and within sight of the furnace. (See the Wiring Diagram label in the furnace and Figure 26.)

The furnace cabinet must have an uninterrupted, unbroken ground to minimize injury should an electrical fault condition occur. The controls used in this furnace require an earth ground to operate properly. Acceptable methods for grounding are electrical wire or conduit approved for electrical ground service. Do not use gas piping as an electrical ground.

**NOTE:** Proper line voltage polarity must be maintained in order for the control system to operate correctly. Verify that the incoming neutral line is connected to the white wire and the incoming "hot" line is connected to the black wire in the junction box. These furnaces will not operate unless polarity and ground are properly connected. See Figure 23.



## CAUTION:

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

### Low Voltage Wiring

Install the thermostat per the manufacturer's instructions. The low voltage (24 volt) connections from the thermostat are made at the terminal strip on the control board in the furnace. See Figure 24 for the proper connections for heating only (two-wire) and heating/cooling (four-wire) applications. The recommended minimum wire gauge for thermostat wiring is shown in Table 12.

The thermostat must not be installed on an outside wall or any other location where its operation may be adversely affected. Adverse affects include radiant loading from fireplaces, sunlight, or lighting fixtures, and convective loading from warm air registers or electrical appliances.

To check the heat anticipator setting either:

1. Add the current draw of the system components; or
2. Measure the current flow on the thermostat R-W circuit after the circulating blower motor has started.

Set the heat anticipator according to the thermostat manufacturer's instructions for heat anticipator settings.

## START-UP AND ADJUSTMENTS

Prior to start-up, verify that:

1. The line voltage power leads are securely connected, that the polarity of the connections is correct, and that the furnace is properly grounded.
2. The thermostat wires (R, W, Y, and G) are securely connected to the correct leads on the terminal strip of the circuit board.
3. The gas line service pressure does not exceed 10.0 in. water column (0.36 psig), and is not less than 4.5 in. water column (0.16 psig) for natural gas. For LP gas the line service pressure must not exceed 14 in. water column (0.51 psig), and must not be less than 11.0 in. W.C. (0.40 psig).
4. The roll-out and vent safety manual reset switches are closed. If necessary, press the red button to reset a switch. See Figure 30 for location. DO NOT install a jumper wire across a switch to defeat its function. If a switch reopens on start-up, DO NOT reset the switch without identifying and correcting the fault condition which caused the switch to trip.
5. The blower door is in place, closing the door switch in the line voltage circuit.
6. The gas line has been purged and all connections are leak tight.

## Start-Up Procedure

1. Set the thermostat to the lowest setting.
2. Close the disconnect(s) to provide line voltage to the furnace.
3. Follow the procedures given on the operating instructions label attached to the furnace.
4. Set the thermostat above room temperature and verify the sequence of operation. (See the SEQUENCE OF OPERATION.)
5. After the furnace has run for approximately five minutes, set the thermostat below room temperature and verify steps (9) through (11) of the SEQUENCE OF OPERATION.

## Verifying and Adjusting Firing Rate

The firing rate must be verified for each installation to prevent over-firing the furnace.

NOTE: The firing rate must not exceed the rate shown on the furnace rating plate. At altitudes above 2000 ft. the firing rate must be adjusted as described in the high altitude section.

Use the following procedure to determine the firing rate:

1. Shut off all other gas fired appliances.
2. Start the furnace and allow it to run for at least three minutes.
3. Measure the time (in seconds) required for the gas meter to complete one revolution.
4. Convert the time per revolution to cubic feet of gas per hour using Table 13.
5. Multiply the gas flow rate in cubic feet per hour by the heating value of the gas in Btu per cubic foot to obtain the firing rate in Btuh.

Example:

- Time for 1 revolution of a gas meter with a 1 cubic foot dial = 40 seconds.
- From Table 9 read 90 cubic feet per hour of gas.
- Heating value of the gas (obtained from gas supplier) = 1040 Btu per cubic foot.
- Firing rate =  $1040 \times 90 = 93,600$  Btuh.

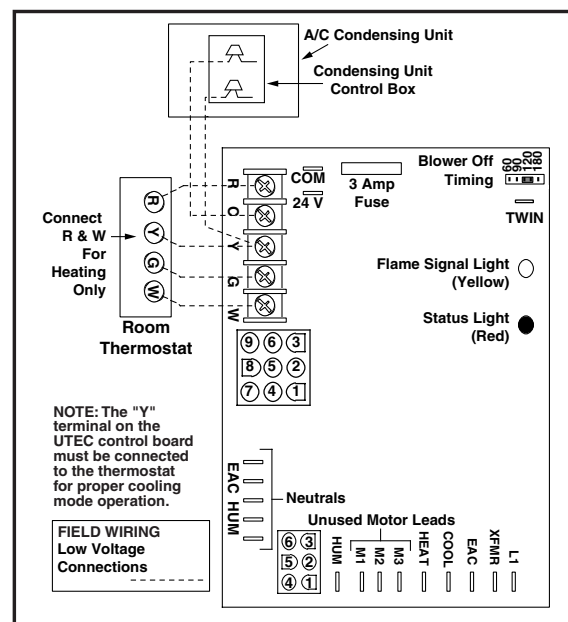


Figure 27. Low Voltage Field, Four-wire Heating/Cooling Applications



6. Adjustments to the firing rate can be made by adjusting the gas manifold pressure. See the High Altitude Application section for additional information of firing rate at elevations above 2000 ft.

The manifold pressure must be set to the appropriate value for your installation. Refer to either Table 8 for natural gas or Table 9 for LP/propane gas to verify the manifold pressure setting required for your particular installation. To adjust the manifold pressure, remove the regulator cap and turn the adjusting screw clockwise to increase pressure or counterclockwise to reduce pressure. Replace the regulator cap after adjustments are complete.



## CAUTION:

**Do not re-drill the burner orifices. If the orifice size must be changed, use only new orifices.**

### Verifying and Adjusting Temperature Rise

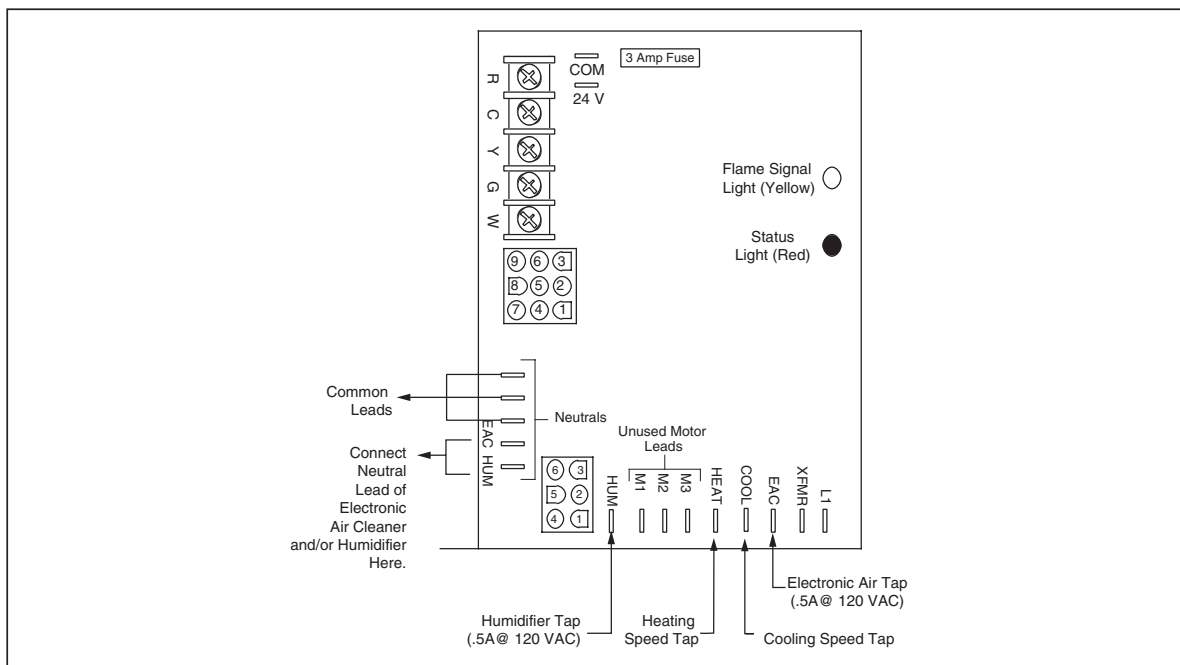
Verify that the temperature rise through the furnace is within the range specified on the furnace rating plate. Temperature rises outside the specified range could result in premature heat exchanger failure.

Place thermometers in the return and supply air stream as close to the furnace as possible. The thermometer on the supply air side must be shielded from direct radiation from the heat exchanger to avoid false readings. Adjust all registers and duct dampers to the desired position and run the furnace for fifteen minutes before taking any temperature readings. The temperature rise is the difference between the supply and return air temperatures.

For typical duct systems, the temperature rise will fall within the range specified on the rating plate with the blower speed at the factory recommended setting. If the temperature rise measured is outside the range specified, it may be necessary to change the blower speed. Lower blower speeds will increase the temperature rise and higher blower speeds will decrease the temperature rise.

The furnace is equipped with a multispeed motor. Heating and cooling speed selection is made by moving the leads on the integrated control board located in the furnace. The wiring diagram on the furnace and Figures 27, 28 and 29 show the speed taps for adjusting motor speed.

If it is desired that the blower operate at the same speed for heating and cooling, tape off the terminal of the unused blower wire. Install the jumper wire, found in the plastic instruction bag, across the HEAT and COOL taps on the



**Figure 28. Blower Speed Tap Location**

GAS FLOW RATE (CUBIC FEET PER HOUR)							
TIME FOR ONE REVOLUTION (SECONDS)	CUBIC FEET PER REVOLUTION OF METER			TIME FOR ONE REVOLUTION (SECONDS)	CUBIC FEET PER REVOLUTION OF METER		
	1	5	10		1	5	10
24	150	750	1500	80	45	225	450
26	138	692	1385	82	44	220	439
28	129	643	1286	84	43	214	429
30	120	600	1200	86	42	209	419
32	113	563	1125	88	41	205	409
34	106	529	1059	90	40	200	400
36	100	500	1000	92	39	196	391
38	95	474	947	94	38	191	383
40	90	450	900	96	38	188	375
42	86	429	857	98	37	184	367
44	82	409	818	100	36	180	360
46	78	391	783	102	35	176	353
48	75	375	750	104	35	173	346
50	72	360	720	106	34	170	340
52	69	346	692	108	33	167	333
54	67	333	667	110	33	164	327
56	64	321	643	112	32	161	321
58	62	310	621	114	32	158	316
60	60	300	600	116	31	155	310
62	58	290	581	118	31	153	305
64	56	281	563	120	30	150	300

**Table 13. Gas Flow Rate**

control board. Reconnect the desired blower tap to the piggyback quick connect.

The blower control is designed to start the circulating air blower 30 seconds after the gas valve is opened. The blower control is factory wired to turn the blower motor off 120 seconds after the gas valve is closed. This timing can be changed using the BLOWER OFF timing switch opposite the terminal block on the control board. (See Figure 28.)

## Verifying Burner Operation

To verify operation of the burners, make sure that the blower compartment door is in place and that there is power to the furnace. Set the thermostat above room temperature and observe the ignition sequence. The flame can be observed through the small clear window on the burner box. The burner flame should carry over between all burners. The flames should be blue, without yellow tips. Flames should extend from each burner without lifting, curling, or floating. After verifying ignition, set the thermostat below room temperature and verify that the burner flame extinguishes completely.

## Verifying Operation of the Supply Air Limit Switch

To verify operation of the supply air limit switch, make sure that the blower door is in place and that there is power to the furnace. Completely block the return airflow to the furnace by installing

a close-off plate in place of or upstream of the filter(s). Set the thermostat above room temperature and verify that the Sequence of Operation is as described in these instructions. The supply air limit switch should function to turn off the gas valve within approximately five minutes. The circulating air and combustion blowers should continue to run when the supply air limit switch opens. Remove the close-off plate immediately after the supply air limit switch opens. If the furnace operates for more than five minutes with no return air, set the thermostat below room temperature, shut off the power to the furnace, and replace the supply air limit switch.

## DESCRIPTION OF COMPONENTS

Figure 28 shows the location of each of the functional components described below. If any component of the furnace must be replaced, use only factory authorized replacement parts. See the Replacement Parts List for each component.

**Flame Sensor** – The flame sensor acts to prove that flame has carried over from the igniter to the opposite end burner. If no flame is sensed, the furnace will be shut down automatically.

**Gas Valve** – The gas valve controls the flow of gas to the burners. When the gas valve is energized it automatically opens and regulates the gas pressure in the manifold.

**Pressure Switch** – The pressure switch verifies that the inducer is drawing the combustion gases

through the heat exchanger. It also senses a blocked condensate drain condition.

**Vent Pressure Switch** – The vent pressure switch reacts to blockage in the vent or combustion air piping.

**Supply Air Limit Switch** – The supply air limit switch prevents the air temperature leaving the furnace from exceeding the maximum outlet air temperature.

**Vent Safety Switch** – The vent safety switch shuts the furnace down if the outlet flue gas temperature increases above 160°F. This switch protects the plastic flue system and the inducer from over-temperature conditions.

**Flame Roll-Out Switch** – This switch provides flame roll-out protection to the furnace and combustion air inlet pipe.

## MAINTENANCE

It is recommended that the furnace be checked yearly. At a minimum, this check should include the following items.



### WARNING:

**To avoid electric shock, personal injury, or death, disconnect the electric power before performing any maintenance.**



### WARNING:

**Holes in the vent pipe or heat exchanger can cause products of combustion to enter the home. Replace the vent pipe or heat exchanger if leaks are found. Failure to prevent products of combustion from being circulated into the living space can create potentially hazardous conditions including carbon monoxide poisoning that could result in personal injury or death.**

## Combustion Air and Vent System

Check the combustion air and vent pipe to ensure that it is not damaged, corroded or blocked by debris. Any damaged section of vent pipe must be replaced, and any obstruction or blockage must be removed prior to operating the furnace.

### Air Filter(s)



### WARNING:

**Never operate the furnace without a filter in place. Dust and lint in the return air can build up on internal components, resulting in loss of efficiency, equipment damage, and possible fire.**

**AIR FILTER(S) ARE NOT SUPPLIED WITH THE FURNACE AS SHIPPED FROM THE FACTORY. FILTERS FOR SIDE RETURN AND BOTTOM RETURN APPLICATIONS ARE AVAILABLE FROM YOUR LOCAL DISTRIBUTORS.**

The installer should provide a filter rack for a high velocity type filter in the return air duct adjacent to the furnace. Filters should be changed or cleaned monthly during the heating season. New or newly renovated homes may require more frequent changing until the construction dust has been removed.

### Lubrication

The bearings in the circulating air blower motors are pre-lubricated and sealed at the factory. No further oiling of the bearings is required for the life of the motor.

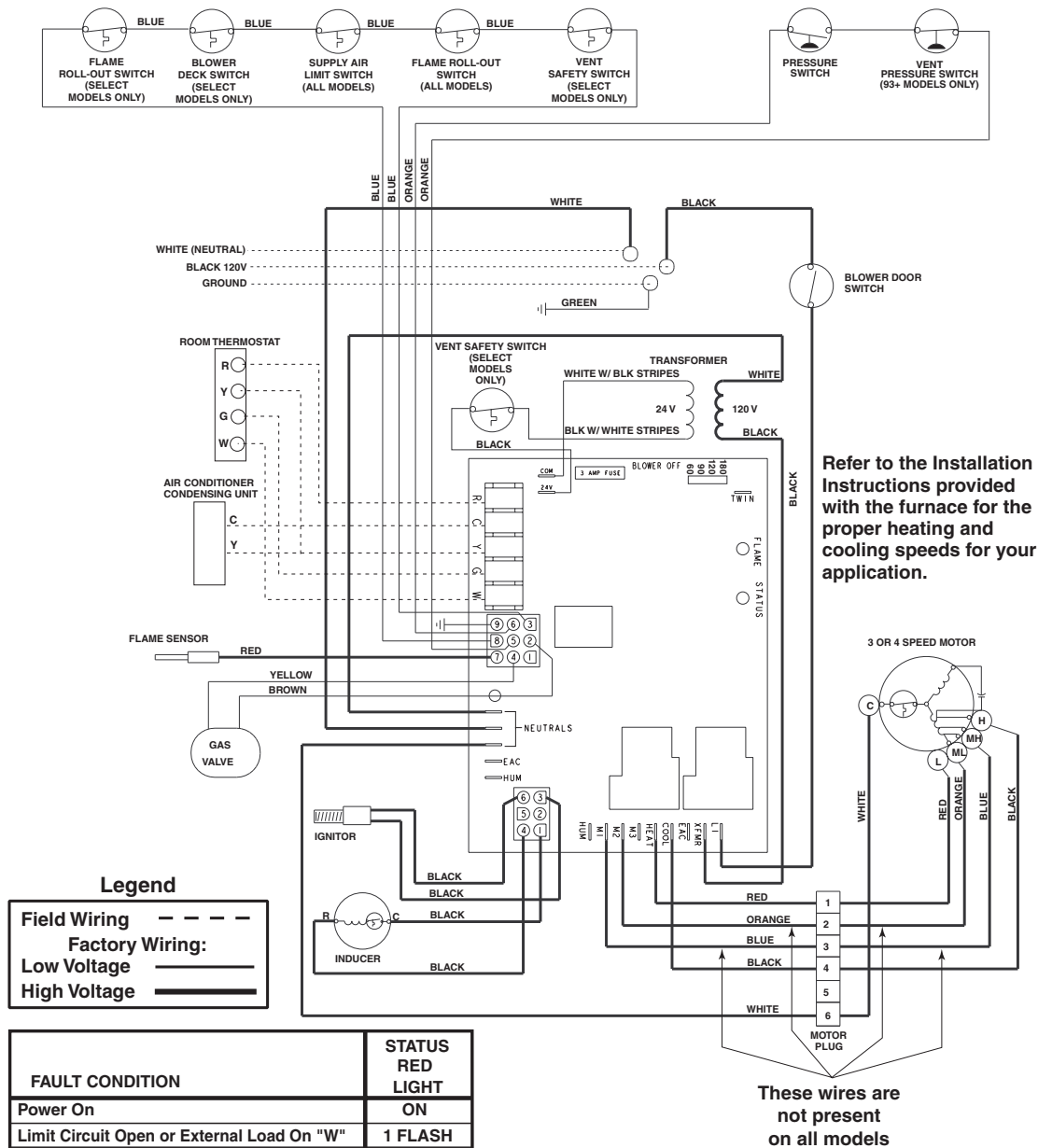
### Condensate Drain Assembly

Be sure the condensate lines are free and open (i.e. avoid kinking hoses). Also make sure all hose clamps are tight to avoid drawing air into the system.

### Blower Compartment

The blower compartment should be cleaned monthly during the heating and cooling seasons

## For Upflow and Downflow Residential Furnaces



FAULT CONDITION	STATUS RED LIGHT
Power On	ON
Limit Circuit Open or External Load On "W"	1 FLASH
Pressure Switch is Open with Inducer On	2 FLASHES
Pressure Switch is Closed with Inducer Off	3 FLASHES
Ignition Failure (Check Ground)	4 FLASHES
115 VAC & Neutral Reversed or no Ground	5 FLASHES
False Flame or Gas Valve Relay Shorted	Continuous
Power Off	OFF

FAULT CONDITION	FLAME YELLOW LIGHT
Low Flame Sensor Signal	Continuous Flash
Flame Present	ON

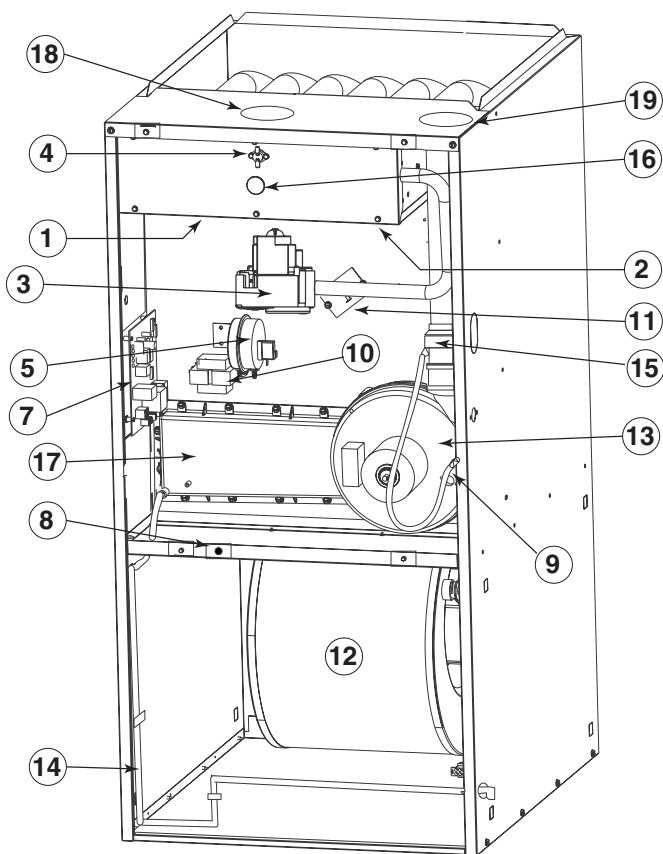
If any of the original wire as supplied with the furnace must be replaced, it must be replaced with wiring material having a temperature rating of at least 105 C.

WD# 710625-0

Figure 29. Upflow and Downflow Wiring Diagram

## Upflow Furnace Models

- 1 Igniter (Not Shown)
- 2 Flame Sensor (Not Shown)
- 3 Gas Valve
- 4 Flame Roll-out Switch(s)
- 5 Pressure Switch
- 6 Vent Pressure Switch (Not Shown)
- 7 Control Board
- 8 Blower Door Switch
- 9 Vent Safety Switch
- 10 Low Voltage Transformer
- 11 Supply Air Limit Switch
- 12 Circulating Air Blower Assembly-
- 13 Induced Draft Blower
- 14 Condensate Drain Tube
- 15 In-Line Drain Assembly
- 16 Burner View Port
- 17 Front Header Box
- 18 Combustion Air Intake
- 19 Exhaust Vent



## Downflow Furnace Models

- 1 Igniter (Not Shown)
- 2 Flame Sensor (Not Shown)
- 3 Gas Valve
- 4 Flame Roll-out Switch(s)
- 5 Pressure Switch
- 7 Control Board
- 8 Blower Door Switch
- 9 Vent Safety Switch
- 10 Low Voltage Transformer
- 11 Supply Air Limit Switch
- 12 Circulating Air Blower Assembly-
- 13 Induced Draft Blower
- 14 Condensate Drain Tube
- 15 In-Line Drain Assembly
- 16 Burner View Port
- 17 Front Header Box
- 18 Combustion Air Intake
- 19 Exhaust Vent

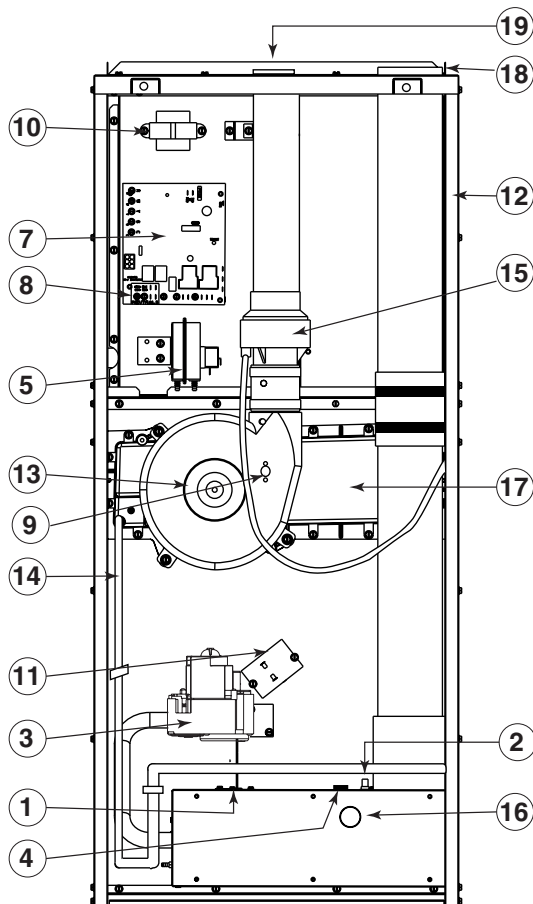


Figure 30. Location of Major Components

to remove any dirt and lint that may have accumulated in the compartment or on the blower and motor. Dirt and lint can create excessive loads on the motor resulting in higher than normal operating temperatures and shortened service life.

### Heat Exchanger and Burner Maintenance

The furnace should operate for many years without excessive soot buildup in the flue passageways, however, the flue passageways, the vent system, and the burners should be inspected and cleaned (if required) by a qualified serviceman annually to ensure continued safe operation. Particular attention must be given to identify deterioration from corrosion or other sources.

## SYSTEM OPERATION INFORMATION

Proper maintenance is most important to achieve the best performance from a furnace. Follow these instructions for years of safe, trouble free operation.

- **Do not place combustible materials on or against the furnace cabinet or the vent pipe.**
- **Do not store gasoline or any other flammable vapors and liquids in the vicinity of the furnace.**
- **Change or replace the air filters monthly during any period when the circulating blower is operating regularly.**
- **Always replace the doors on the furnace after servicing. Do not operate the furnace without all doors and covers in place.**
- **Avoid operating the furnace when windows and doors are open.**
- **Be sure that the thermostat is properly installed and is not being affected by drafts or heat from lamps or other appliances.**

### Sequence of Operation

Operating sequences for the heating, cooling, and fan modes are described below. Refer to the wiring diagrams (Figures 29) and the voltage field wiring diagram (Figure 26).

#### Heating Mode:

1. On a call for heat the thermostat closes, applying 24 VAC to the W terminal on the control board.
2. The control board checks for continuity on the 24 VAC limit control circuit (over-temperature limit switch, flame rollout switches and blocked vent switch in series). If an open limit is detected the control board will energize the inducer and the conditioned air blower. All other system functions will be inoperable until the limit circuit closes. While the limit is open, the red LED will pulse at a rate of 1 blink per unit time.
3. The furnace control checks for continuity across the pressure switch (24 VAC). If the pressure switch is closed the heat mode sequence will not continue. If it remains closed for 10 seconds the red LED will blink 3 times repetitively until the fault condition clears.
4. The inducer is energized.
5. The pressure switch will close. If the pressure switch does not close after 10 seconds the fault LED will blink 2 times repetitively and the inducer will continue to run until the switch is closed.
6. The inducer will pre-purge for 30 seconds and then the igniter will start its warm-up as follows:  
  
Initial Power up: After 30 seconds of igniter warm-up the gas valve (24 VAC) will then open. The igniter circuit will stay energized for 3 seconds after the gas valve opens.  
  
After Initial Power up: The control has a programmed adaptive ignition feature which varies the warm-up period as follows: If ignition is successful the warm-up is reduced by 3-seconds on each subsequent call for heat until ignition failure occurs. Upon ignition failure, the warm-up is increased by 3-seconds on the next try. If successful, the timing remains fixed at this level. In general, whenever ignition failure occurs the warm-up interval is increased by 3-seconds on the next try. And if successful, it remains there. Minimum and maximum warm-up time limits are set at 6 and 54-seconds, respectively.
7. The furnace control must prove flame via the flame the flame sensor 5 seconds after the gas valve opens. If flame is sensed, all burners are on and the igniter cools off. If no flame is sensed, the gas valve closes immediately and the inducer continues to run.

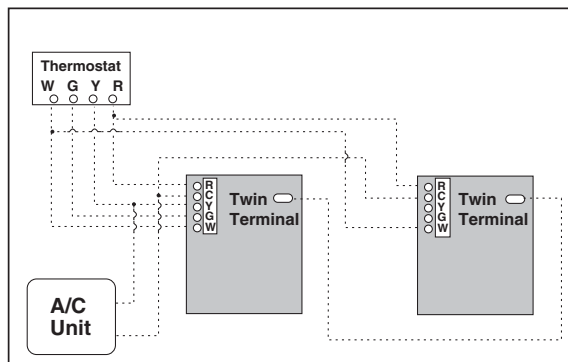


A second trial for ignition (step 6) begins if no flame is sensed. On the fifth try for ignition, the furnace control is locked out and the red LED will blink 4 times repetitively. The thermostat must be opened for at least ten seconds to reset the furnace control after a lock out. Otherwise, the furnace will attempt another ignition sequence in 1 hour.

8. The furnace control energizes the circulating air blower on the heating speed 30 seconds after the gas valve circuit is energized .
9. When the thermostat has been satisfied, gas valve is de-energized.
10. The inducer is de-energized after a 30 second postpurge.
11. The furnace control keeps the circulating air blower energized for 120 seconds (factory set) or 60, 90, or 180 seconds (field adjustable). (See Figure 27.)
12. Abnormal conditions: If a limit opens during operation, the inducer and circulating air blower continue to operate. The gas valve is de-energized immediately. The blowers continue to operate until the limit closes. When the limit closes the inducer blower is de-energized immediately. The circulating air blower continues to operate for the specified delay (factory set at 120 seconds).

#### *Cooling Mode:*

1. On a call for cooling the thermostat closes, applying 24 VAC to the G and Y terminals on the furnace control. This closes the compressor contactor.
2. The furnace control energizes the circulating blower (115 VAC) on the cooling speed.
3. When the thermostat is satisfied, the G and Y terminals on the control board are de-energized opening the compressor contactor.
4. The circulating air blower is de-energized after a 90 second delay.



**Figure 31. Twinning**

#### *Fan Mode:*

1. On a call for fan operation, the thermostat applies 24 VAC to the G terminal on the furnace control board.
2. The circulating air blower is energized immediately on the heating speed.
3. If the furnace is operated in the continuous ON position at the thermostat and is then switched to AUTO, the circulating blower will operate for a specified delay (factory set at 120 seconds).

## **Furnace Fails to Operate**

If the furnace does not operate check the following:

1. Is the thermostat operating properly?
2. Are the blower compartment door(s) in place?
3. Is the furnace disconnect closed?
4. Has the circuit breaker tripped or the control board fuse burned open?
5. Is the gas turned on?
6. Are any manual reset switches open?
7. Is the filter dirty or plugged?
8. Is the flame sensor coated? (Remove and clean with emery cloth.)

If the furnace locks out after 5 attempts for ignition, it will try again every hour if a call for heat remains. If the inducer and circulating air blowers are operating, and items 1 through 8 have been checked, press the red reset button on the vent safety switch. (See Figure 30.) If the furnace operates after depressing the reset button, contact a qualified serviceman to identify and repair the problem.

If the furnace continues to not operate, depress the red reset buttons on the flame rollout switches. (See Figure 30.) If the furnace operates after depressing the reset buttons, contact a qualified servicemen to identify and repair the problem.

## **Twining of Two Furnaces**

The control board on these furnaces is capable of being twinned to another furnace of the same series, provided the circuit boards are both UTEC type. If using UTEC control boards, leave the fuses installed on each board. The thermostat wires and the 1/4 inch quick-connect terminals marked "TWIN" on the furnace controls must be connected together for twinning. (See Figure 31.)

## INSTALLATION/PERFORMANCE CHECK LIST

LOCATION \_\_\_\_\_ CITY \_\_\_\_\_ STATE \_\_\_\_\_  
INSTALLER \_\_\_\_\_ CITY \_\_\_\_\_ STATE \_\_\_\_\_  
UNIT MODEL # \_\_\_\_\_ UNIT SERIAL # \_\_\_\_\_  
Minimum Clearances per Table 3? \_\_\_\_\_ Return Air Temperature: \_\_\_\_\_ (° F)  
Electrical Connections tight? \_\_\_\_\_ Temperature Rise: \_\_\_\_\_ (° F)  
Line Voltage Polarity correct? \_\_\_\_\_  
Supply Voltage: \_\_\_\_\_ Volts Are Flue Connections tight? \_\_\_\_\_  
Blower Motor HP: \_\_\_\_\_ Is there Proper Draft? \_\_\_\_\_  
FUEL TYPE: Is Vent free from restrictions? \_\_\_\_\_  
Natural Gas \_\_\_\_\_ LP/Propane \_\_\_\_\_ Is the Filter(s) secured in place? \_\_\_\_\_  
Gas Piping Connections leak-tested? \_\_\_\_\_ Is the Filter(s) clean? \_\_\_\_\_  
Gas Line Pressure: \_\_\_\_\_ Has the Thermostat been calibrated? \_\_\_\_\_  
(in. water column, with furnace operating) Is the Thermostat level? \_\_\_\_\_  
Manifold Pressure: \_\_\_\_\_ Is the Heat Anticipator Setting correct? \_\_\_\_\_  
(in. water column, with furnace operating) Has the Owner's Information been reviewed with  
Is there adequate fresh air supply for the homeowner? \_\_\_\_\_  
combustion and ventilation? \_\_\_\_\_ Has the Literature Package been left near the  
Furnace Input: \_\_\_\_\_ (Btuh) furnace? \_\_\_\_\_  
Supply Air Temperature: \_\_\_\_\_ (° F)



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