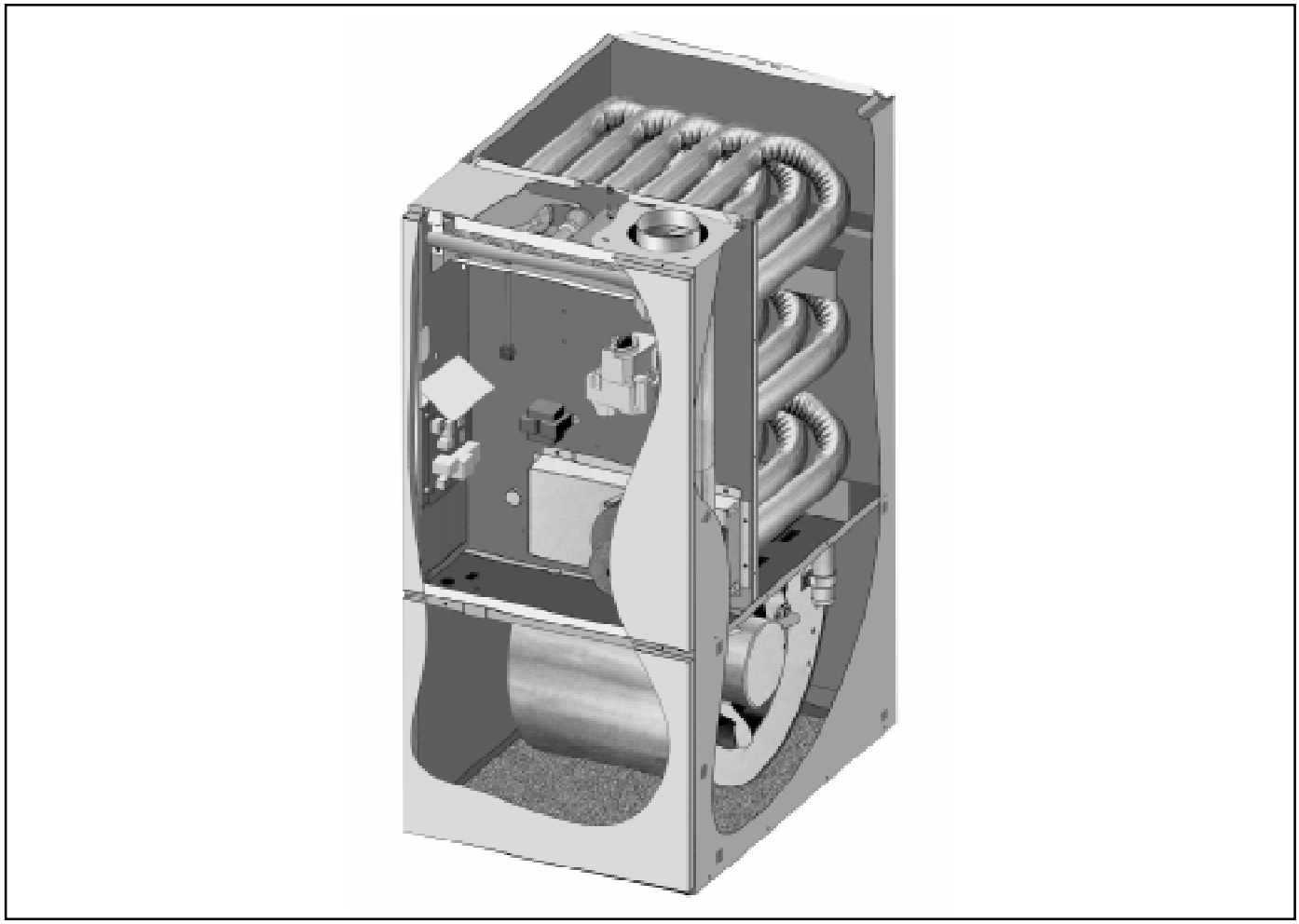
G6 Series

80+ Mid Efficiency Upflow Horizontal/ Downflow Models



Service Manual

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INTRODUCTION

This service manual is designed to be used in conjunction with the installation manual provided with each furnace.

This furnace represents the very latest in mid efficiency gas furnace technology. Consequently, certain controls within the furnace consist of highly sophisticated electronic components which are not user serviceable. Therefore, it is essential that only competent, qualified service personnel attempt to install, service, or maintain this product.

This service manual was written to assist the professional HVAC service technician to quickly and accurately diagnose and repair any malfunctions of this product.

This service manual covers both upflow/horizontal models and downflow models installed as Category I and Category III applications. The overall operation of all these models is basically the same with the exception of certain controls that are unique to a particular model.

This manual, therefore, will deal with all subjects in a general nature (I.E. all text will pertain to all models) unless that subject is unique to a particular model or family, in which case it will be so indicated.

It will be necessary then for you to accurately identify the unit you are servicing, so you may be certain of the approved diagnosis and repair. (See Unit Identification on *Page 4.*)

This manual was prepared by the senior Technical Service and Communication Departments.

⚠ WARNING

The information contained in this manual is intended for use by a qualified service technician who is familiar with the safety procedures required in installation and repair and who is equipped with the proper tools and testing instruments.

Installations and repairs made by unqualified persons can result in hazards subjecting the unqualified person making such repairs to the risk of injury or electrical shock which can be serious or even fatal not only to them, but also to persons being served by the equipment.

If you install or perform service on equipment, you must assume responsibility for any bodily injury or property damage which may result to you or others. We will not be responsible for any injury or property damage arising from improper installation, service, and/or service procedures.

FURNACE SPECIFICATIONS - Upflow G6RA Models

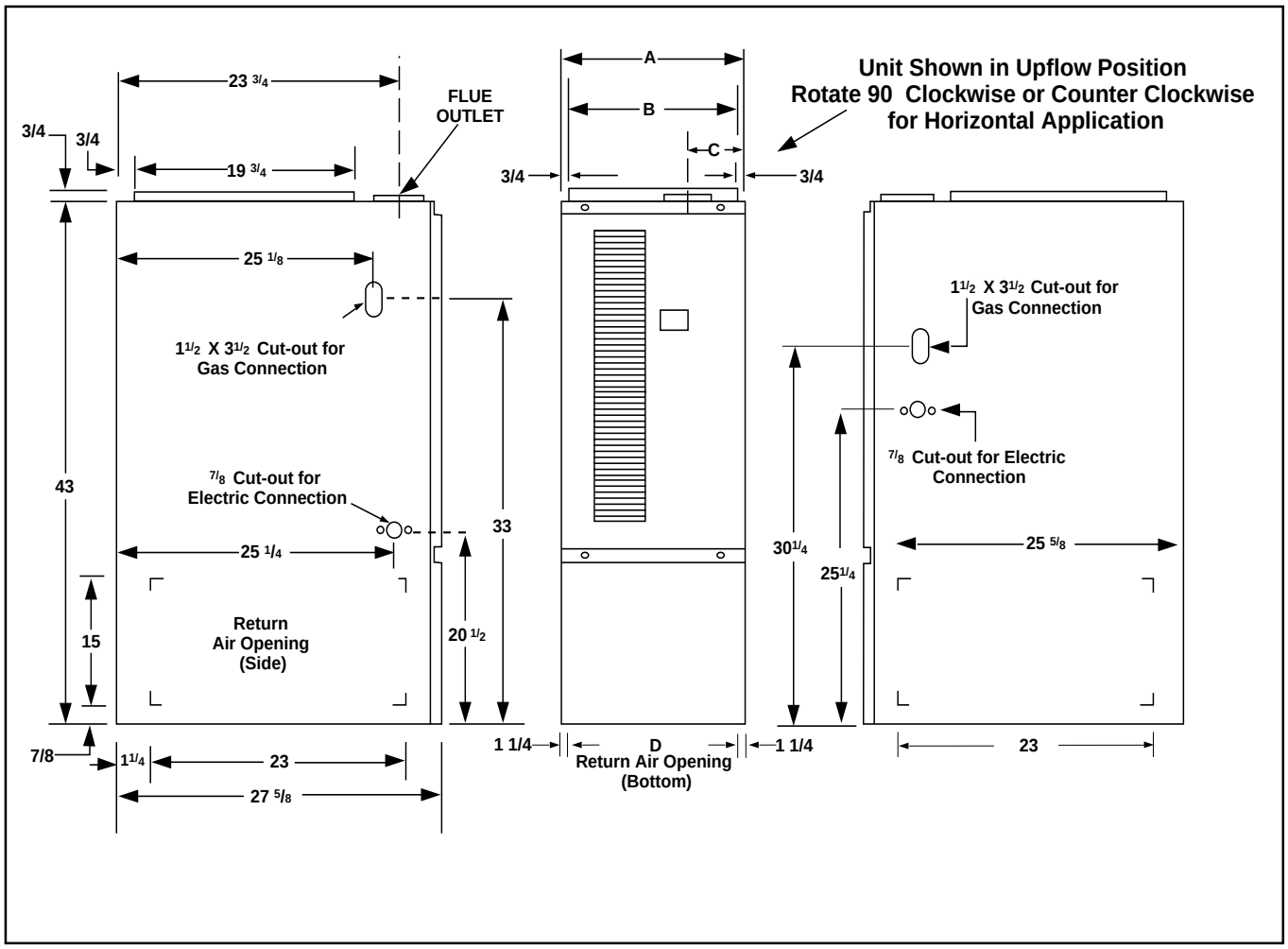


Figure 1. G6RA Unit Dimensions

FURNACE DIMENSIONS AND SHIPPING WEIGHTS							
	Furnace	Dimensions				Shipping	
Model	Input (Btuh)	A (in.)	B (in.)	C (in.)	Flue Outlet (in.)	Weight (lbs)	D (IN.)
G6RA045(*)-08	45,000	14 1/4	12 3/4	3 1/4	3	108	11 3/4
G6RA060(*)-12	60,000	14 1/4	12 3/4	3 3/4	4	120	11 3/4
G6RA072(*)-12	72,000	14 1/4	12 3/4	3 3/4	4	120	11 3/4
G6RA072(*)-16	72,000	19 3/4	18 1/4	3 3/4	4	125	17 1/4
G6RA096(*)-12	96,000	19 3/4	18 1/4	3 3/4	4	157	17 1/4
G6RA096(*)-16	96,000	19 3/4	18 1/4	3 3/4	4	158	17 1/4
G6RA096(*)-20	96,000	22 1/2	21	3 3/4	4	165	20
G6RA120(*)-16	120,000	19 3/4	18 1/4	3 3/4	4	172	17 1/4
G6RA120(*)-20	120,000	22 1/2	21	3 3/4	4	174	20
G6RA144(*)-20	144,000	22 1/2	21	4 1/4	5	183	20

Table 1A. G6RA Furnace Dimensions and Shipping Weights

FURNACE SPECIFICATIONS - Downflow G6RK Models

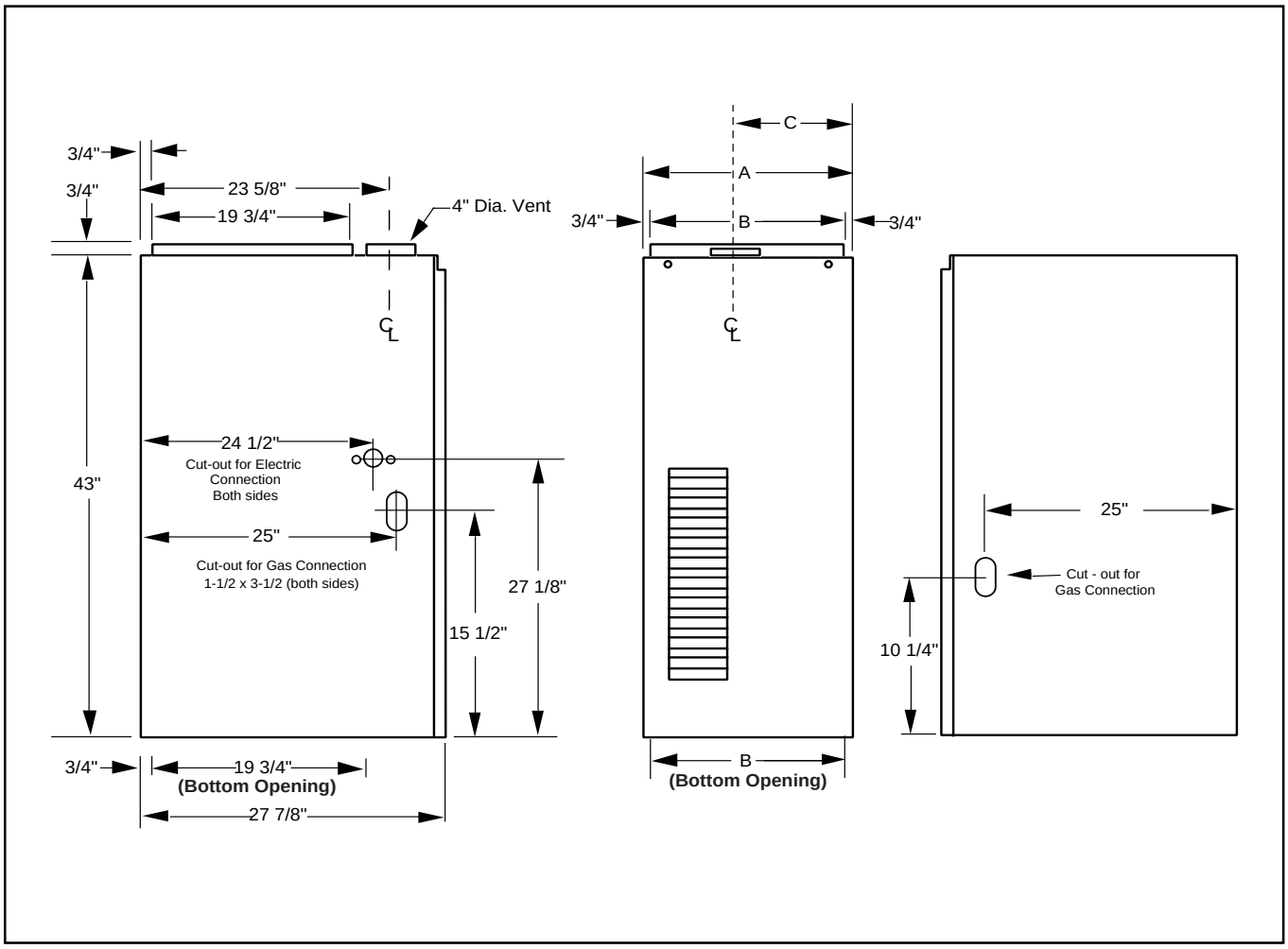
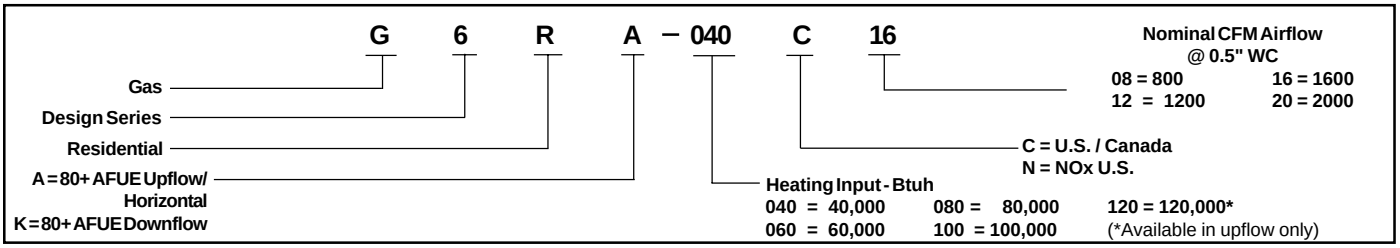


Figure 1A. G6RK Unit Dimensions

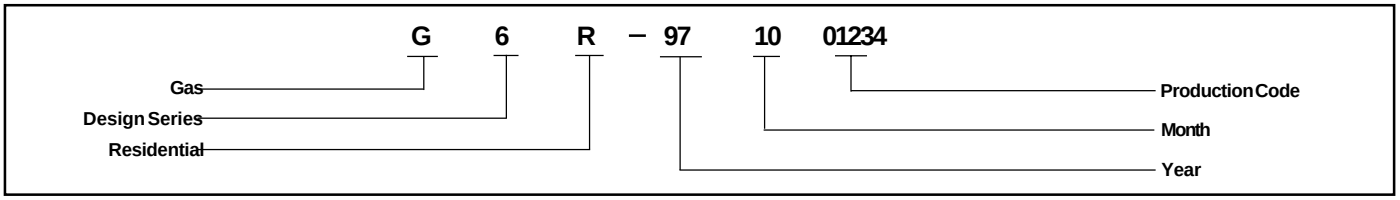
FURNACE DIMENSIONS AND SHIPPING WEIGHTS					
Model Number	Furnace Input (Btuh)	Dimensions			Shipping Weights (lbs)
		A inches	B inches	C inches	
G6RK060C-12	60,000	14 1/4	12 3/4	5 1/2	105
G6RK072C-12	72,000	14 1/4	12 3/4	5 1/2	115
G6RK072C-16	72,000	19 3/4	18 1/4	11	130
G6RK096C-12	96,000	19 3/4	18 1/4	11	150
G6RK096C-16	96,000	19 3/4	18 1/4	11	158
G6RK120C-20	120,000	19 3/4	18 1/4	11	170

Table 1B. G6RK Furnace Dimensions and Shipping Weights

MODEL IDENTIFICATION CODE



SERIAL NUMBER IDENTIFICATION CODE



FURNACE SPECIFICATIONS

G6RA MODEL NUMBERS:	-045( )08	-060( )12	-072( )12	-072( )16	-096( )12	-096( )16	-096( )20	-120( )16	-120( )20	-144( )20
Input-Btuh (a)	45,000	60,000	72,000	72,000	96,000	96,000	96,000	120,000	120,000	144,000
Heating Capacity - Btuh	36,000	48,000	58,000	58,000	77,000	77,000	77,000	96,000	96,000	115,000
AFUE	**80+**	**80+**	**80+**	**80+**	**80+**	**80+**	**80+**	**80+**	**80+**	**80+**
Max. Htg. Ext. St. Press. In W.C.	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
Blower D x W	10 x 6	10 x 6	10 x 6	10 x 10	10 x 10	10 x 10	11 x 10	10 x 10	11 x 10	11 x 10
Motor H.P. -Speed -Type	1/5 - 3 - PSC	1/3 - 3 - PSC	1/3 - 3 -PSC	1/2 - 4 -PSC	1/3 - 3 - PSC	1/2 - 4 -PSC	3/4 - 4 -PSC	1/2 - 4 -PSC	3/4 - 4 -PSC	3/4 - 4 -PSC
Motor FLA	2.8	6.0	6.0	7.9	6.0	7.9	11.1	7.9	11.1	11.1
Temperature Rise Range - °F	45 - 75	45 - 75	45 - 75	40 - 70	50 - 80	50 - 80	40 - 70	50 - 80	45 - 75	45 - 75
Approximate Shipping Wt. - lbs.	108	120	120	125	157	158	165	172	174	183

All models are 115 V, 60 HZ. Gas connections are 1/2" N.P.T
AFUE= Annual Fuel Utilization Efficiency

G6RK MODEL NUMBERS	-060C-12	-072C-12	-072C-16	-096C-12	-096C-16	-120C-20
Input-Btuh (a)	60,000	72,000	72,000	96,000	96000	120,000
Heating Capacity - Btuh	48,000	58,000	58,000	77,000	77,000	96,000
AFUE	**80+**	**80+**	**80+**	**80+**	**80+**	**80+**
Blower D x W	10 x 6	10 x 6	10 x 10	10 x 8	10 x 10	11 x 10
Motor H.P. -Speed -Type	1/3 - 3 - PSC	1/3 - 3 - PSC	1/2 - 4 -PSC	1/3 - 3 -PSC	1/2 - 4 -PSC	3/4 - 4 -PSC
Motor FLA	6.0	6.0	7.9	6.0	7.9	11.1
Maximum Ext. SP - In. W.C.	0.5	0.5	0.5	0.5	0.5	0.5
Temperature Rise Range - °F	35 - 65	45 - 75	35 - 65	45 - 75	40 - 70	40 - 70
Approx. Shipping Wt. lbs.	105	115	130	150	158	170

Clearances to Combustibles

This furnace is Design Certified by A.G.A. Laboratories, and approved by Canadian Gas Association (CGA) for the minimum clearances to combustible material listed in Table 2. See the furnace name plate, located inside the furnace cabinet, for specific model number and clearance information.

The G6RA furnace is certified for use on wood flooring. This furnace must not be installed directly on carpeting, tile, or any combustible material other than wood flooring.

⚠ WARNING:

Do not place combustible material on or against the furnace cabinet or within 6 inches of the vent pipe. Do not place combustible materials, including gasoline and any other flammable vapors and liquids, in the vicinity of the furnace.

Downflow Warning (G6RK Models):

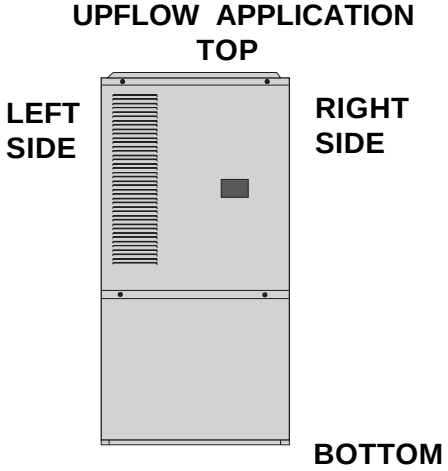
The design of the downflow furnace is certified for natural or propane gas and for installation on non-combustible flooring. A special combustible floor sub-base is required when installing on a combustible floor. Failure to install the sub-base may result in fire, property damage and personal injury. The special downflow sub-bases are factory supplied accessories, part numbers 902677 and 902974. 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 the burners and the ignitor are located not less than 18 inches (457 mm) above the floor, and the furnace must be located or protected to avoid physical damage by vehicles.

⚠ CAUTION:

The Downflow Sub-base must not be installed directly on carpeting, tile, or any combustible material other than wood flooring.

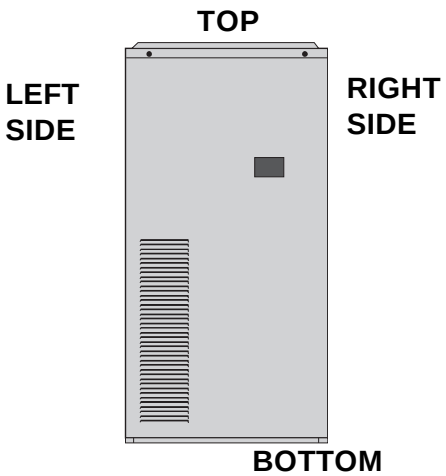
G6RA Furnaces

UPFLOW APPLICATION



G6RK Furnace

DOWNFLOW APPLICATION

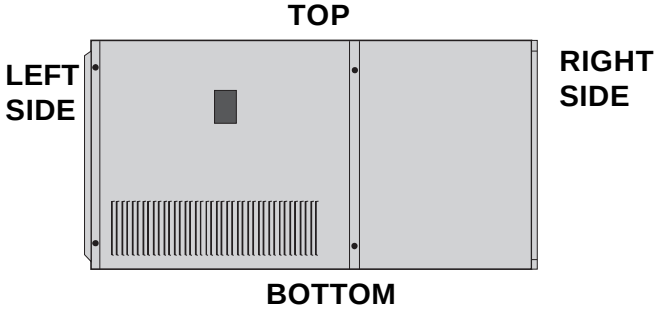


UPFLOW/DOWNFLOW INSTALLATION CLEARANCES

Vent Connector Type	Standard Single Wall Metal Vent	Type B-1 Double Wall Metal Vent
LEFT SIDE	0"	0"
RIGHT SIDE	5"	0"
VENT	6"	1"
BACK	0"	0"
BOTTOM	0"	0"
TOP	1"	1"
*** FRONT**	4"	4"

* Allow 36" minimum clearance for service.

HORIZONTAL APPLICATION



HORIZONTAL INSTALLATION CLEARANCES

Vent Connector Type	Standard Single Wall Metal Vent	Type B Double Wall Metal Vent
LEFT SIDE	1"	1"
RIGHT SIDE	0"	0"
VENT	6"	1"
BACK	0"	0"
BOTTOM	0"	0"
TOP	5"	0"
*** FRONT**	4"	4"

* Allow 36" minimum clearance for service.

Table 2. Minimum Clearances to Combustible Material

A clearance of at least 36 inches from the front of the furnace is recommended to allow for servicing and maintenance. **Where accessibility clearances are greater than the minimum clearances, accessibility clearances must take precedence.**

CIRCULATING AIR SUPPLY

General

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.

⚠ 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 result in personal injury or death.
All return ductwork must be adequately sealed, all joints must be taped, and the ductwork must be secured to the furnace with sheet metal screws. 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 fireplace insert, stove, etc.

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.

Return Air

In applications where the supply ducts carry heated air to areas outside the space in which the furnace is installed, the return air must be delivered to the furnace by duct(s) sealed to the furnace casing, running full size and without interruption between the outside space and the one in which the furnace is installed.

⚠ WARNING

The solid base of the furnace must be in place when the furnace is installed with side return air ducts. Removal of all or part of the base could cause products of combustion to be circulated into the living space and create potentially hazardous conditions, including carbon monoxide poisoning that could result in personal injury or death.

The return air ductwork may be connected to any or all of the following: left side return, right side return, or bottom return. Table 3 shows the airflow data for each furnace model. **Where maximum airflow is 1800 CFM or more, two openings must be used.**

CAPACITIES—Furnace Airflow Data

Upflow Furnace Airflow Data												
G6RA Furnace Model No.	Motor HP	Motor Speed	External Static Pressure (Inches Water Column)									
			0.1		0.2		0.3		0.4		0.5	
			CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise
045C-08	1/5	High *	1000	-	970	-	950	-	920	-	870	-
		Medium	760	46	740	47	730	47	720	48	690	50
		Low **	630	55	620	56	610	57	600	58	570	61
060C-12	1/3	High *	1380	-	1350	-	1310	-	1260	-	1210	-
		Medium	1220	-	1190	-	1160	-	1120	-	1070	-
		Low **	820	57	800	58	780	59	760	61	730	63
072C-12	1/3	High *	1380	-	1350	-	1310	-	1260	-	1210	-
		Medium	1220	46	1190	47	1160	48	1120	49	1070	52
		Low **	820	68	800	69	780	71	760	73	730	76
072C-16	1/2	High *	1980	-	1910	-	1830	-	1760	-	1660	-
		Med-High	1710	-	1660	-	1610	-	1540	-	1470	-
		Med-Low	1490	-	1470	-	1420	-	1380	-	1320	-
		Low **	1270	44	1250	45	1230	45	1190	47	1140	49
096C-12	1/3	High *	1530	-	1450	-	1390	-	1300	-	1220	-
		Medium**	1380	64	1320	67	1250	71	1190	75	1100	81
		Low	930	-	900	-	870	-	820	-	750	-
096C-16	1/2	High *	1980	-	1910	-	1840	-	1760	-	1680	-
		Med-High	1720	-	1670	-	1610	-	1560	-	1480	-
		Med-Low **	1470	50	1440	52	1410	53	1370	54	1320	56
		Low	1270	58	1240	60	1220	61	1190	62	1140	65
096C-20	3/4	High *	2340	-	2290	-	2280	-	2180	-	2150	-
		Med-High	1910	-	1880	-	1860	-	1830	-	1810	-
		Med-Low	1520	49	1510	49	1490	50	1480	50	1460	51
		Low **	1370	54	1350	55	1340	55	1320	56	1300	57
120C-16	1/2	High *	1900	-	1830	-	1750	-	1630	-	1580	-
		Med-High **	1720	54	1670	56	1610	58	1560	59	1480	63
		Med-Low	1450	64	1420	65	1380	67	1340	69	1280	72
		Low	1260	-	1230	-	1200	-	1170	-	1120	-
120C-20	3/4	High *	2300	-	2250	-	2190	-	2130	-	2090	-
		Med-High	1910	49	1880	49	1860	50	1830	51	1800	52
		Med-Low**	1540	60	1530	61	1520	61	1500	62	1480	63
		Low	1320	-	1310	-	1300	-	1280	-	1260	-
144C-20	3/4	High *	2240	-	2190	-	2130	-	1070	-	2020	-
		Med-High**	1900	49	1860	50	1820	51	1780	52	1740	53
		Med-Low	1520	61	1510	61	1490	62	1480	63	1450	64
		Low	1330	-	1310	-	1290	-	1280	-	1250	-

Downflow Furnace Airflow Data												
G6RK Furnace Model No.	Motor Speed	Motor HP	External Static Pressure (inches Water Column)									
			0.1		0.2		0.3		0.4		0.5	
			CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise
060C-12	High *	1/3	1380	-	1345	-	1330	-	1260	-	1230	-
	Medium		1180	39	1145	40	1130	41	1110	42	1080	43
	Low **		830	56	810	57	805	58	795	58	780	59
072C-12	High *	1/3	1380	-	1345	-	1330	-	1260	-	1230	-
	Medium		1180	47	1145	49	1130	49	1110	50	1080	52
	Low **		830	67	810	69	805	69	795	70	780	71
072C-16	High *	1/2	1850	-	1790	-	1775	-	1755	-	1735	-
	Med-High		1460	-	1435	-	1420	-	1400	-	1380	-
	Med-Low		1210	46	1195	47	1180	47	1160	48	1140	49
	Low **		1020	55	1010	55	995	56	975	57	955	58
096C-12	High *	1/3	1475	50	1460	51	1445	51	1430	52	1410	53
	Medium **		1200	62	1195	62	1180	63	1165	64	1145	65
	Low		795	-	785	-	770	-	755	-	735	-
096C-16	High *	1/2	1950	-	1890	-	1865	-	1835	-	1805	-
	Med-High		1600	46	1580	47	1555	48	1525	49	1495	50
	Med-Low **		1375	54	1360	55	1335	56	1305	57	1275	58
	Low		1180	63	1165	64	1440	65	1110	67	1080	69
120C-20	High *	3/4	2440	-	2395	-	2385	-	2375	-	2360	-
	Med-High		1920	48	1910	48	1900	49	1890	49	1875	49
	Med-Low**		1630	57	1620	57	1610	58	1600	58	1585	59
	Low		1430	65	1425	65	1415	66	1405	66	1390	67

*** Factory wired cooling speed tap**
**** Factory wired heating speed tap**
- Not Recommended

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

Table 4. Furnace Airflow Data

VENTING AND COMBUSTION AIR REQUIREMENTS

General

Provisions must be made in the installation of this furnace to provide an adequate supply of air for combustion. Detailed instructions for determining the adequacy of an installation can be found in the current revision of the National Fuel Gas Code (ANSI Z223.1 / NFPA54) or in applicable local building codes. **Consult local codes for special requirements**. For Canadian installations consult Canadian Installations Codes and (CAN/CGA B149.1 or .2).

If the furnace is operated with inadequate air for combustion one of the flame roll-out switches located in the burner compartment or the vent switch will open, turning off the gas supply to the burners. These safety devices are manually reset switches. DO NOT install jumper wires across these switches to defeat their function. DO NOT reset a switch without identifying and correcting the fault condition. If a switch must be replaced, use only the correct part specified in the Replacement Parts List.

Air openings in the furnace door, warm air registers, and return air grilles must not be restricted.

⚠ CAUTION:

Combustion air must not be drawn from a corrosive atmosphere.

To maximize heat exchanger life, the combustion air must be free of chemicals which form corrosive acidic compounds in the combustion gases. Some examples of these chemicals are chlorine, fluorine, and sulphur. Some common sources of these chemicals are detergents, bleaches, aerosol sprays, cleaning solvents, and a wide variety of commercial and household products.

When installing a furnace in a commercial building or in a laundry room or workshop of a residence, it may be necessary to provide outside air to the furnace for combustion.

⚠ 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.

Installation 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 input and a furnace rated at 75,000 Btuh requires a volume of 6,000 cubic feet [50 x (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. However, in "tight" buildings (with weather stripping and caulk to reduce infiltration), it may be necessary to provide outside air to ensure adequate combustion and venting, even though the furnace is located in an unconfined space.

Installation In A Confined Space

A confined space is an area with volume less than 50 cubic feet per 1,000 Btuh of the combined input rates of all appliances drawing combustion air from that space. Furnace closets, small equipment rooms and garages are confined spaces. Furnaces installed in a confined space which supply heated air to areas outside the space must draw return air from outside the space and must have the return air ducts tightly sealed to the furnace. **A confined space must have two openings into the space for combustion air. One opening must be within 12 inches of the ceiling, and the other must be within 12 inches of the floor**. The required sizing of these openings is determined by whether inside or outside air is used to support combustion, the method by which the air is brought to the space, and by the total input rate of all appliances in the space.

Horizontal Furnace Installation

The G6RA can be installed horizontally in an attic, basement, crawl space or alcove. It can be suspended from a ceiling in a basement or utility room in either a right to left airflow or left to right airflow. (See Figures 1 and 2.)

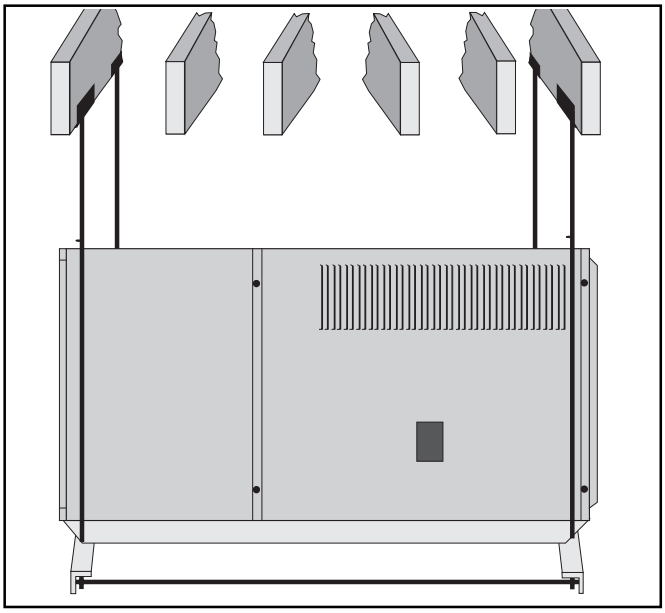


Figure 1. G6RA Horizontal Installation Suspended in Attic or Crawl Space

If the furnace is to be suspended from the ceiling, it will be necessary to use steel straps around each end of the furnace. These straps should be attached to the furnace with sheet metal screws and to the rafters with bolts. The furnace could also be suspended by an angle iron frame bolted to the rafters. (See Figure 1.)

Thirty six (36) inches between the front of the furnace and adjacent construction or other appliances should be maintained for service clearance.

Keep all insulating materials away from the louvered door. Insulating materials may be combustible.

The G6RA may be installed directly on combustible wood flooring or supports, if type "B-1" vent pipe is used (See Figure 2). It is recommended for further reduction of fire hazard that cement board or sheet metal be placed between the G6RA and the combustible floor and extend 12 inches beyond the front of the louvered door.

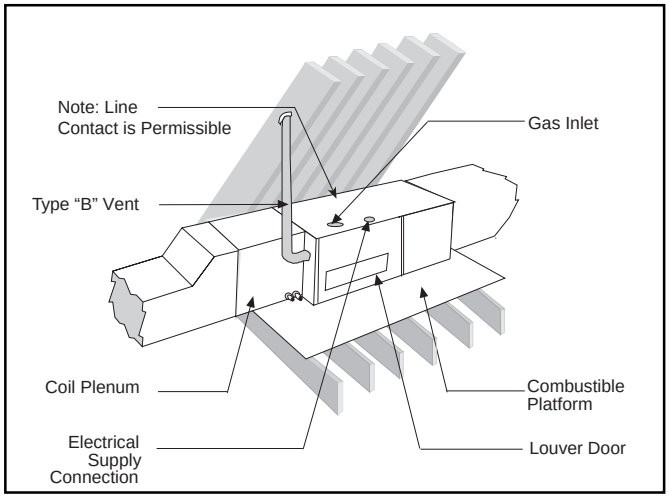


Figure 2. G6RA Horizontal installation on a Platform

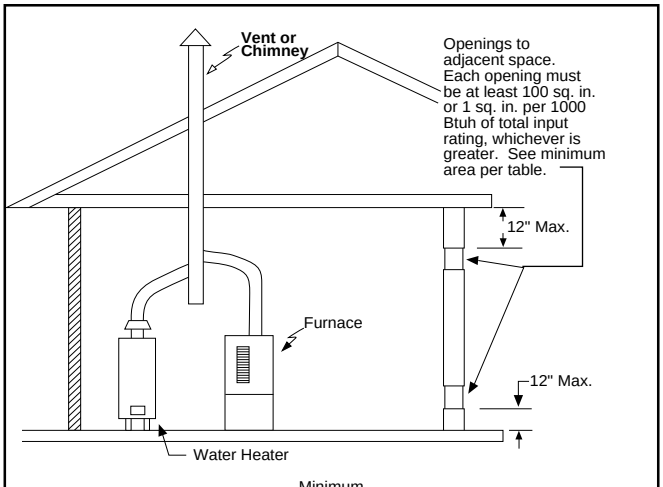
For venting follow the guidelines specified under the venting section.

⚠ 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.

Air From Inside (See Figure 3)

If combustion air is taken from the heated space, the two openings must *each* have a free area of at least one square inch per 1,000 Btuh of total input of all appliances in the confined space, but **not less than 100 square inches of free area.** 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.

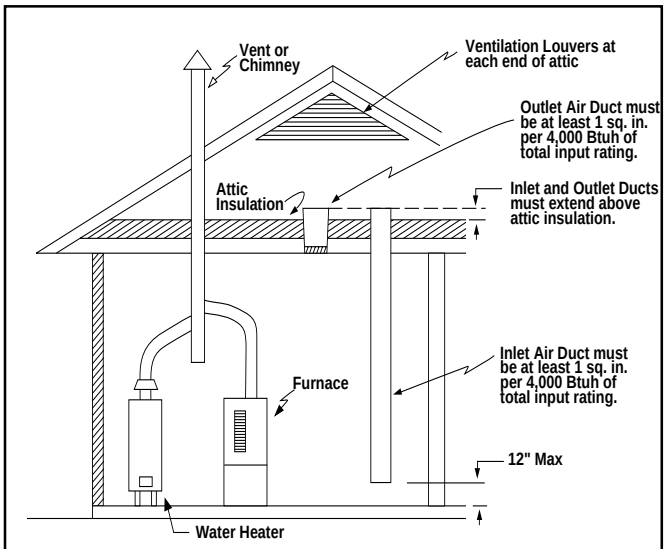


Total Input Rating (Btu/hr)	Minimum Free Area (Each Opening)	Round Duct Diameter
40,000	100 sq. in.	12"
60,000	100 sq. in.	12"
80,000	100 sq. in.	12"
100,000	100 sq. in.	12"
120,000	120 sq. in.	13"
140,000	140 sq. in.	14"
160,000	160 sq. in.	15"

Figure 3. Equipment in a Confined Space with all Combustion Air Drawn from the Inside

Outdoor Air Using Vertical Ducts
(See Figure 4)

If combustion air is taken from outdoors through vertical ducts, the openings and ducts must have a minimum free area of one square inch per 4,000 Btuh of total appliance input. In installations drawing combustion air from a ventilated attic, both air ducts must extend above the attic insulation.



a. All Combustion Air from Ventilated Attic.

Total Input Rating (Btu/hr)	Minimum Free Area (Each Opening)	Round Duct Diameter
40,000	10 sq. in.	4"
60,000	15 sq. in.	5"
80,000	20 sq. in.	5"
100,000	25 sq. in.	6"
120,000	30 sq. in.	6"
140,000	35 sq. in.	7"
160,000	40 sq. in.	8"

Figure 4. Equipment in a Confined Space with all Combustion Air Drawn from the Outside through Vertical Ducts

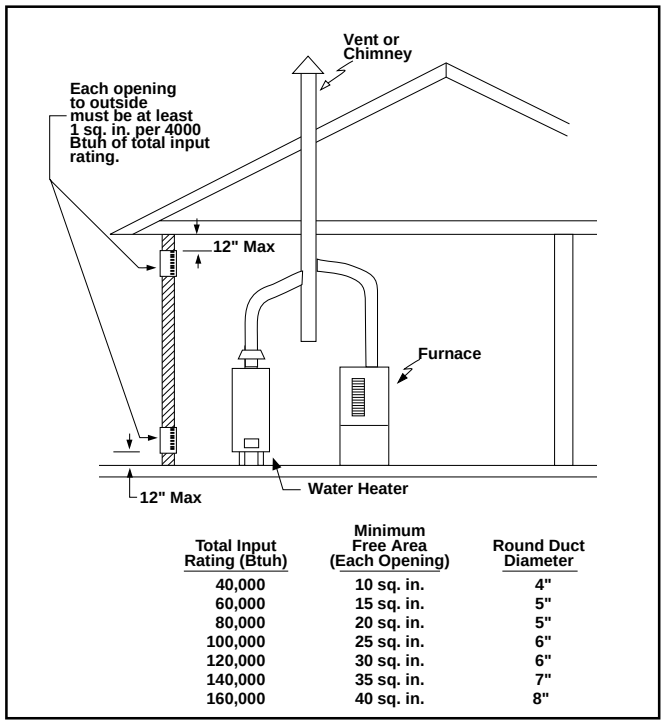
If the unit is installed in an area with an exhaust fan, provide sufficient ventilation to prevent negative pressures from occurring in the room.

The combustion air openings must not be restricted in any manner.

⚠ 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.

Air Directly Through An Exterior Wall
(See Figure 5)
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.



Total Input Rating (Btuh)	Minimum Free Area (Each Opening)	Round Duct Diameter
40,000	10 sq. in.	4"
60,000	15 sq. in.	5"
80,000	20 sq. in.	5"
100,000	25 sq. in.	6"
120,000	30 sq. in.	6"
140,000	35 sq. in.	7"
160,000	40 sq. in.	8"

Figure 5. Equipment in a Confined Space with all Combustion Air Drawn from the Outside through Exterior Wall

Outdoor Air Using a Crawl Space and Ventilated Attic (See Figure 6)
When directly communicating with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 Btuh of total appliance input. The openings shall communicate directly, or by ducts, with the outdoor spaces (crawl or attic) that freely communicate with the outdoors.

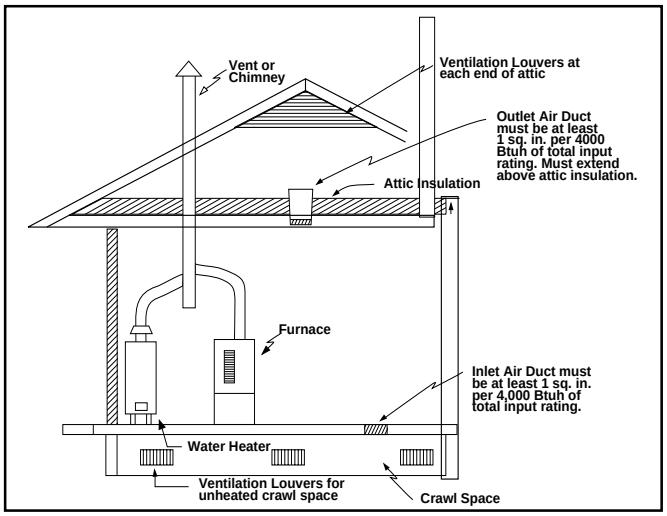
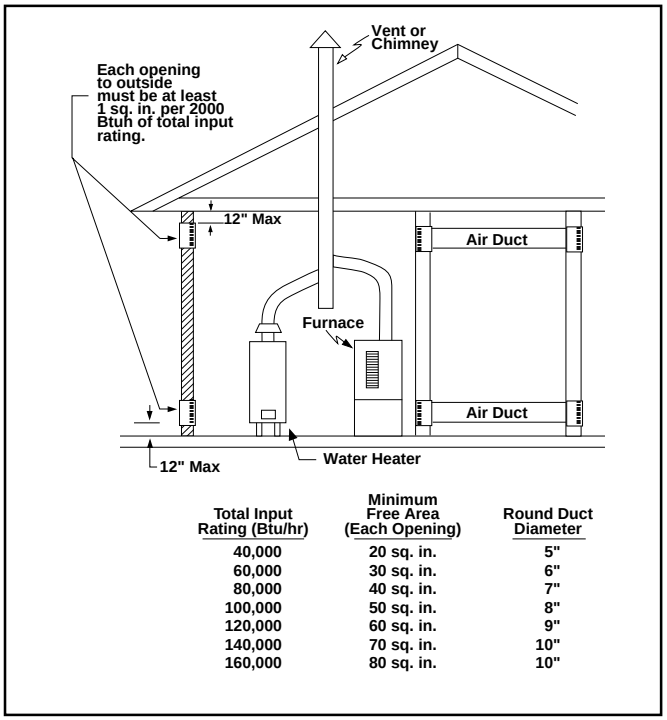


Figure 6. Equipment in a Confined Space with All Combustion Air Drawn from a Crawl Space and Ventilated Attic

Outdoor Air Using Horizontal Ducts (See Figure 7)
If combustion air is taken from outdoors through horizontal ducts, the openings and ducts must have a minimum free area of one square inch per 2,000 Btuh of total appliance input.

If the unit is installed in an area with an exhaust fan, provide sufficient ventilation to prevent negative pressures from occurring in the room.

The combustion air openings must not be restricted in any manner.



Total Input Rating (Btu/hr)	Minimum Free Area (Each Opening)	Round Duct Diameter
40,000	20 sq. in.	5"
60,000	30 sq. in.	6"
80,000	40 sq. in.	7"
100,000	50 sq. in.	8"
120,000	60 sq. in.	9"
140,000	70 sq. in.	10"
160,000	80 sq. in.	10"

Figure 7. Equipment in a Confined Space with all Combustion Air Drawn from the Outside through Horizontal Ducts

VENTING REQUIREMENTS

General

This furnace must be vented in compliance with, the current revision of the National Fuel Gas Code (ANSI-Z223.1/NFPA54), with the instructions provided below, and with the Category I Venting Tables provided with the furnace.

In Canada, venting shall conform to the requirements of the current (CAN/CGA B149.1 or .2) installation codes. **Consult local codes for special requirements.**

This furnace must never be vented to a chimney flue servicing a fireplace or other appliance designed to burn solid fuel. If the furnace vent is to be connected to a chimney serving a fireplace, the fireplace must be sealed off from the chimney.

The furnace vent, if metal, may be insulated if local codes allow. Any part of the vent system, metal vent only, not exposed to weather, but which are exposed to ambient temperatures below 35° F must be insulated to prevent condensation. All vent insulation shall be foil backed fiberglass of one inch minimum thickness.

Category I - Common Venting

When an existing furnace is removed from a venting system serving other appliances, the venting system is likely to be too large to properly vent the remaining appliances.

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

(a) Seal any unused openings in the venting system.

(b) 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 or other deficiencies which could cause an unsafe condition.

(c) In 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. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they shall operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

(d) Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance shall operate continuously.

(e) Test for draft hood equipped appliance spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.

(f) 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.

(g) If improper venting is observed during any of the above tests, the venting system must be corrected.

(Categorie I) — Proceder comme suit pour chaque appareil raccorde a la tuyauterie d'evacuation et en etat normal de fonctionnement; tous les autres appareils raccordes a la meme tuyauterie d'evacuation doivent etre mis hors service:

(a)sceller toute ouverture non utilisee de la tuyauterie d'evacuation.

(b)s'assurer que la tuyauterie d'evacuation presente des dimensions et une pente horizontale conformes a la norme ANSI Z223.1, intitulee National Fuel Gas Code ou aux codes d'installation CAN/CGA-B149, ainsi qu'aux presentes instructions. S'assurer que la tuyauterie n'est pas bloquee, restreinte, corrodee, qu'elle ne fuit pas et qu'elle ne presente aucun autre defaut potentiellement dangereux.

(c)dans la mesure du possible, fermer toutes les portes et fenetres du batiment, et toutes les portes entre la piece ou se trouve l'appareil raccorde a la tuyauterie d'evacuation et les autres pieces du batiment. Mettre en service les secheuses et tout autre appareil qui n'est pas raccorde a la tuyauterie d'evacuation. Faire fonctionner a regime maximal tout ventilateur d'evacuation, tel que les hottes de cuisiniere et les ventilateurs de salles de bains. Ne pas mettre en service les ventilateurs d'ete. Fermer les registres des foyers.

(d)respecter les instructions d'allumage. Mettre en service l'appareil a l'essai. Regler le thermostat de maniere a ce que l'appareil fonctionne sans interruption.

(e)s'assurer qu'un appareil muni d'un coupe-tirage ne presente aucune fuite a l'ouverture du coupe-tirage apres que le bruleur principal ait fonctionne pendant cinq minutes. Employer la flamme d'une allumette ou d'une chandelle.

(f)apres avoir determine que tous les appareils raccordes a la tuyauterie d'evacuation evacuent correctement tel que prescrit ci-dessus, rouvrir les portes at les fenetres et remettre les ventilateurs d'evacuation, les registres de foyers et tout autre appareil fonctionnant au gaz a leur etat de fonctionnement initial.

(g)si un appareil n'evacue pas correctement a la suite de l'un des essais ci dessus, corriger la tuyauterie d'evacuation.

The venting system should be designed to have the minimum number of elbows or turns. All horizontal runs shall be sloped upwards from the furnace at 1/4 inch per running foot of vent. Supports for the vent pipe must be installed a minimum of every five feet along the vent run to ensure no displacement after installation.

Under no circumstances shall any portion of the vent system extend into or pass through any return air duct, supply air duct, or plenum.

If the furnace is operated with blocked or restricted venting, the blocked vent switch located in the vent plate will open, turning off the gas supply to the burners. The blocked vent switch is a manually reset device. DO NOT install a jumper wire across this switch to defeat its function. DO NOT reset the switch without identifying and correcting the fault condition which caused the switch to trip. If this switch must be replaced, use only the part specified in the Replacement Parts List.

⚠ WARNING:

Upon completion of the furnace installation, carefully inspect the entire flue system both inside and outside the furnace to assure it is properly sealed. Leaks in the flue system can result in serious personal injury or death due to exposure of flue products, including carbon monoxide.

Category III - Horizontal Venting

NOTE: The reduced NOx models (eighth character N) are not approved as a Category III (Categorie III) furnace for use with horizontal venting.

The furnaces are approved for use with 3" single wall AL29-4C stainless steel vent pipe in horizontal vent applications. This pipe is available from the following manufacturers:
Z-FLEX Inc. - vent brand name **(Z-VENT)**
Heat-fab Inc. - vent brand name **(Saf-T Vent)**
Flex-L International - vent brand name **(Star-34 Vent)**

This vent pipe must be used for the entire length of the vent run. The installation must be in accordance with all instructions supplied by the vent manufacturer for use on Category III appliances. When venting horizontally this is a Category III furnace, the vent pressure is positive, and the venting system must be sealed.

For horizontal venting installations in both the United States and Canada the transition assembly must be modified, the bleed tube must be added to the pressure switch tube, and the vent switch must be by-passed. The bleed tube is found in an envelope, attached to the furnace literature.

Horizontal Venting For G6RA Models:

NOTE: An optional horizontal vent kit will be required. See Vent Kit Bleed Tube Chart on Page 40.

1. Remove the rubber tubing from the pressure switch sensor tube and the collector pan sensor tube. Cut 1/2 inch from one end of the rubber sensor tube, fold in half and cut along the bend line. Discard the 1/2 inch long piece and place the other two pieces on both ends of the bleed tube, do not cover the hole in the bleed tube. Place the assembly back on the pressure switch sensor tube and the collector pan sensor tube. (See Figure 8.)

2. Remove the nut and restrictor plate from the vent collar assembly and discard the restrictor plate. Remove the cover plate from the envelope attached to the furnace literature, and fit the clearance hole over the weld stud. The cover plate must cover the hole(s) on the vent collar assembly. Tighten the nut securely while holding the cover plate in position. (See Figure 9.)

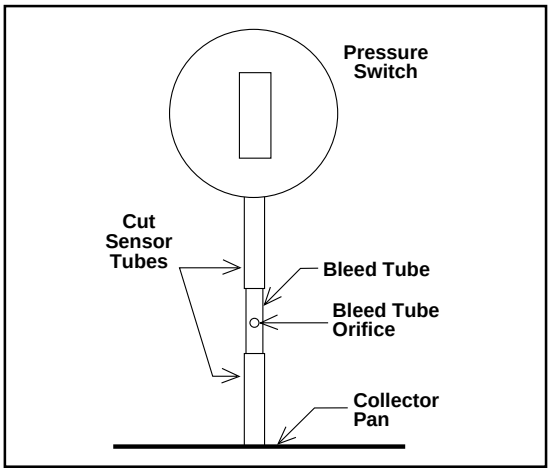


Figure 8. G6RA Bleed Tube Installation

3. Bypass the vent switch by removing both wires from the vent switch and attaching them to the wire nut. (See Figure 10.)

Horizontal Venting For G6RK Models:

NOTE: An optional horizontal vent kit will be required. See Vent Kit Bleed Tube Chart on Page 40.

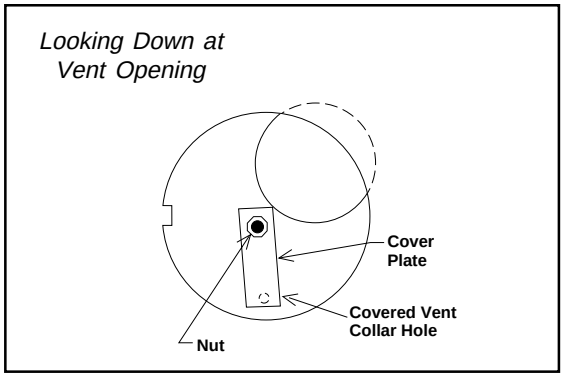


Figure 9. G6RA Vent Collar Detail

1. By-pass the vent switch, located on blower compartment door, by removing both wires from the switch. Remove wire terminals, strip wires and tie together in a wire nut. (See Figure 11.)

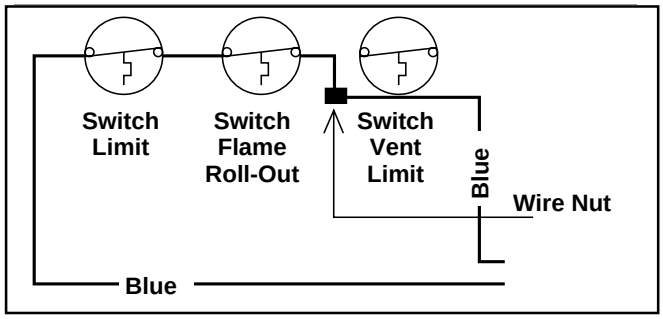


Figure 10. Limit Circuit Wiring

2. Remove the rubber tubing from the pressure switch sensor tube and the collector pan sensor tube. Cut the tubing approximately 3" from one end and insert the bleed tube into the tubing. **Do not cover the hole in the bleed tube.** Place the tubing assembly back on the pressure switch sensor tube and collector pan sensor tube. (See Figure 11.)
3. To gain access to the restrictor plate, remove and discard the combustion tube from the transition assembly. **Insure the seal between inducer and transition assembly is not broken.** (See Figure 12.)
4. Remove and discard the restrictor plate and screw from the transition assembly. (See Figure 12.)
5. Install and seal a 4" to 3" reducer to the transition. (See Figure 13.) Attach the new high temperature vent pipe to the reducer.

The components of the horizontal vent system must not be penetrated, with screws, rivets, or other devices, either when joining pipes and fittings or using support straps. All joints must be sealed with high temperature silicone before locking

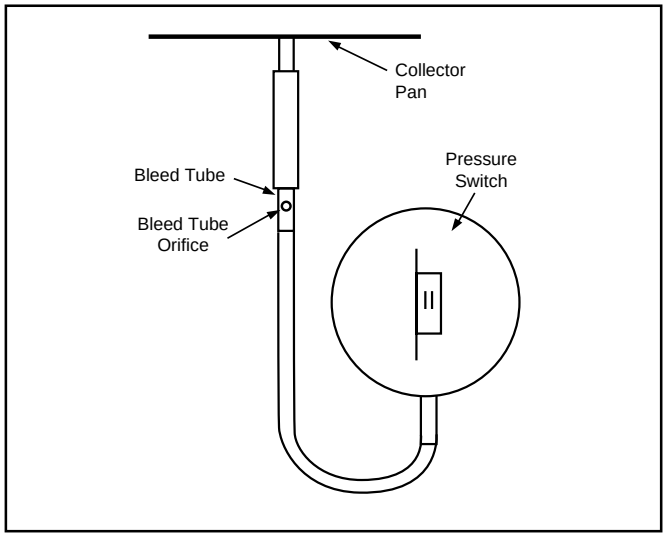


Figure 11. G6RK Bleed Tube Installation

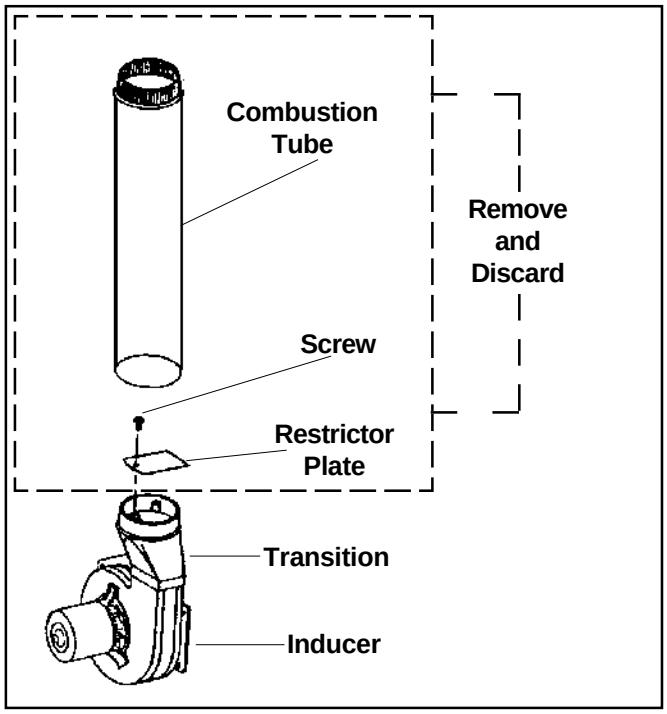


Figure 12. G6RK Horizontal Vent Modification

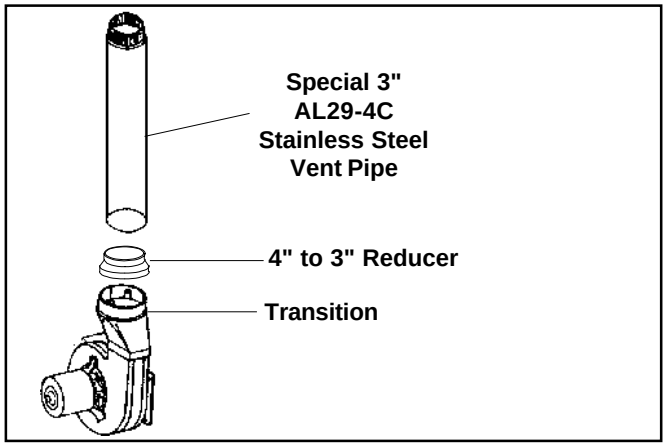


Figure 13. G6RK Reducer Installation

⚠ CAUTION:

Do not drill holes through the vent pipe or fittings on a horizontally vented furnace. Do not use sheet metal screws, or rivets. Drilling, screws, or rivets will cause leaks.

bands are installed. If the lengths of pipe must be cut, the joint must still be sealed with silicone and the locking band used. When installing the condensate tube be sure to form a trap by means of a 3" loop filled with water. (See Figure 14.)

Keep the number of pipe fittings to a minimum. Maintain a minimum of 6 inches of air space between the vent and combustibles at all times, this includes inside and outside the building.

NOTE: The direction of the male-female joints from the drain tee to the termination tee is opposite to standard gas appliance venting. The male end of the pipes point towards the furnace.

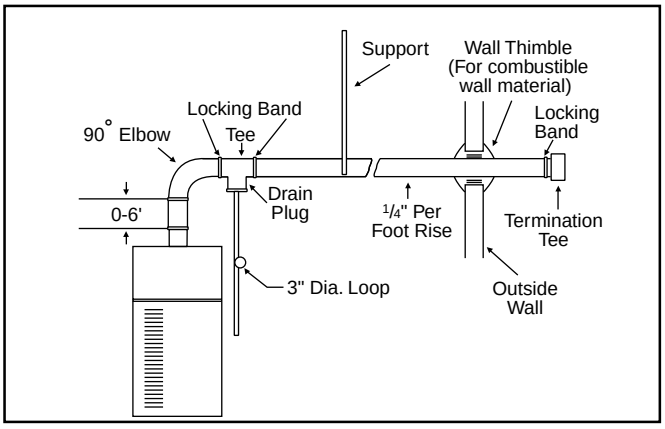


Figure 14. Typical Horizontal Vent Installation

1. Apply an adhesive bead around the outside of the pipe approximately 1/4" from the end of the pipe. This includes the first fitting or pipe attached to the furnace.
2. Push the pipe and fitting together while twisting the pipe or fitting. Twisting the pipe or fitting spreads the adhesive completely within the fitting socket.
3. When the pipe is at the socket bottom, inspect the joint. Look for a complete, uninterrupted ring of adhesive material around the pipe at the fitting socket. Additional adhesive or rotation of the pipe or fitting may be required for a complete seal. The complete adhesive material ring provides the seal required for the positive pressure vent.
4. All vent systems must include a tee and drain plug for collection and disposal of condensate. The drain tee must be installed within the first 5 feet of vent run to protect the furnace.
5. All horizontal sections must have a slope toward the drain tee of not less than 1/4" per foot to prevent the collection of condensate at any location other than at the tee.
6. Horizontal runs must be supported with 3/4" pipe strap at a maximum of 5 foot intervals and at each point where an elbow is used.
7. Maintain a 6 inch minimum air space to combustibles from all sections of the stainless steel vent system, except when a wall thimble is used.

Through-The-Wall Power Venting — The Tjerlund GPAK-1TN through-wall kit is certified for use with G(-) Series furnaces. The kit includes a power venter, a side-wall vent hood and a barometric draft control. It has an electrical interlock to assure that the furnace will not operate when the power venter is off.

The kit is for use only when exhaust is through an exterior wall, normally with horizontal vent piping. The power venter establishes negative pressure in the vent piping and the furnace operates as if connected to Category I vertical venting.

Installation Instructions are provided with the kit. Installation must conform to those instructions and applicable requirements of local codes.

Horizontal Venting (Thru-the-Wall) Venting Requirements

Furnace Model Number	Pipe Size	Reducer Needed	Maximum # Elbows	Max. Feet Vent Pipe
G6RA045C-08	3"	None	4	35
G6RA060C-12	3"	4" to 3"	4	35
G6RA072C-12	3"	4" to 3"	4	35
G6RA096C-16	3"	4" to 3"	4	35
G6RA096C-20	3"	4" to 3"	4	35
G6RA120C-16	3"	4" to 3"	4	35
G6RA120C-20	3"	4" to 3"	4	35
G6RA144C-20	3"	*4" to 3"	3	30
Note: Special 5" to 4" Reducer Kit, p/n 902249 required for model number G6RA144C-20.				
G6RK060C-12	3"	4" to 3"	4	35
G6RK072C-12	3"	4" to 3"	4	35
G6RK072C-16	3"	4" to 3"	4	35
G6RK096C-12	3"	4" to 3"	4	35
G6RK096C-16	3"	4" to 3"	4	35
G6RK120C-20	3"	4" to 3"	4	35

Table 4. Horizontal Venting Requirements

Flexible Vent Systems

⚠WARNING:

The entire vent system must be sealed with a high temperature sealant which will withstand temperatures of 450°F. Recommended sealants: Dow Corning Sealant 736 RTV; GE 106 RTV; High Tech Ind., High TEMP RED.

Location of Outdoor Terminations

Horizontal Installation

The vent termination tee must be installed with the following minimum clearances. (See Figure 15.)

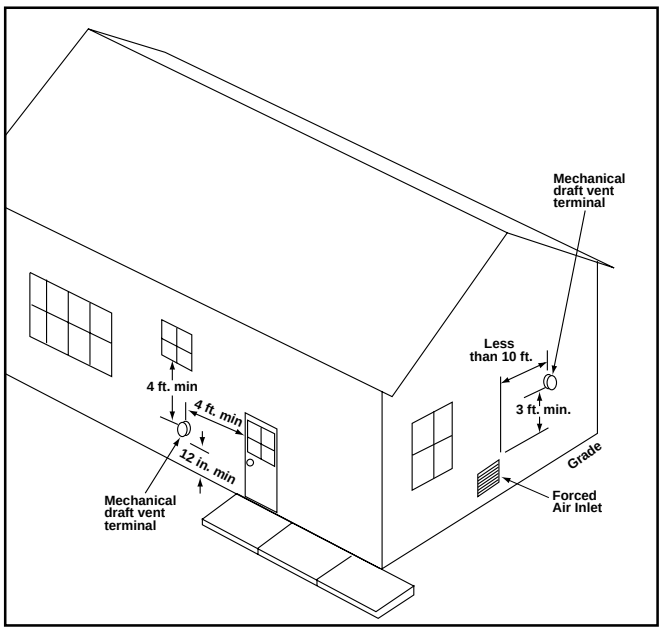


Figure 15. Vent Termination Clearances

1. The termination tee must be 12 inches above snow level or grade level which ever is higher. See Figure 16 for alternate method to achieve 12" above snow level.
2. The minimum distance from any door, (openable) window, or gravity air inlet is 4 ft. below, 4 ft. horizontally, or 1 ft. above.
3. The vent termination shall be a minimum of 3 ft. above any forced air inlet within 10 ft. (See Figure 15.)
4. Recommended minimum distance from an inside corner formed by two exterior walls is 6 ft., but is not required.
5. The minimum distance from gas or electric meter(s) is 4 ft.

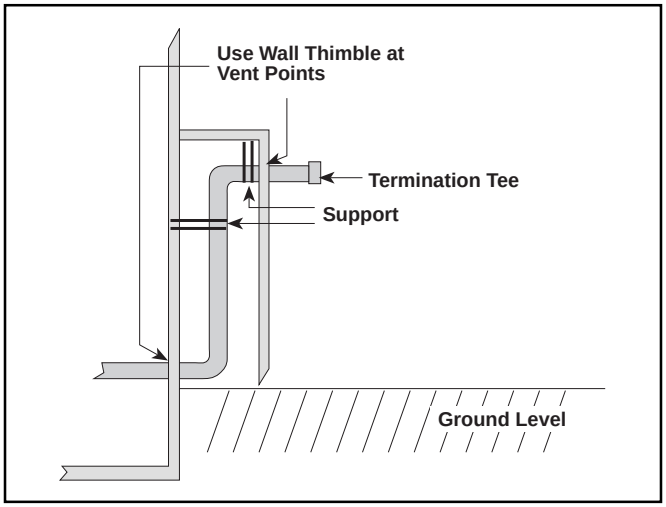


Figure 16. Alternate Horizontal Vent Installation

6. Avoid areas where condensate drainage may cause problems such as above planters, patios, or adjacent to windows where the steam from the flue gases may cause fogging. Do not terminate above any public walkway.
7. Select the point of wall penetration where the minimum 1/4 inch per foot of upward slope can be maintained.
8. When penetrating a noncombustible wall, the hole through the wall must be large enough to maintain the pitch, pipe clearance for passage, and provide for proper sealing. Penetrating a combustible wall requires the use of a wall thimble. (See Figure 22.) A 6-1/2 inch square framed opening is required to insert the thimble halves. The thimble is adjustable to varying wall thickness and is held in place by applying sealant to the male sleeve before assembly. Also run a bead of sealant around the outer wall thimble.
9. The vent pipe must extend 1-1/4 inches through the outer thimble half for a combustible wall. Be sure to check this carefully before cutting the vent pipe.
10. Attach a 3 inch coupling to the end of the pipe that extends through the wall or thimble. This prevents the vent pipe from being pushed inward.
11. Cut an 8 inch minimum piece of vent pipe and connect the coupling to the termination tee. The inside of the tee must be a minimum of 12 inches from the outside of the wall. (See Figure 17.)

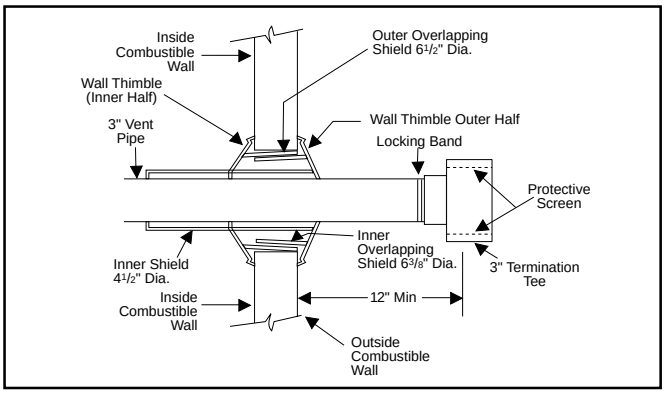


Figure 17. Typical Termination

Flexible gas vent is approved for use in vertical single vent or common vent installations only. The minimum distance to combustibles is 1" for type B insulated and 6" for single wall. The venting system must be installed in accordance with the local authorities, the vent manufacturer's instructions and the instructions listed below.

The flexible vent must be installed in accordance with the venting tables for vertical or common venting only. The vent system must be supported in horizontal runs with 3/4" pipe strap at a maximum of 5 foot intervals. All horizontal sections must have a slope toward the furnace of not less than 1/4" per foot. The vent must not sag, or have any bends greater than 90 degrees.

Leak Check

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.

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 off the main shut-off valve.

ELECTRICAL WIRING

General

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 7 for electrical requirements.

SYSTEM OPERATION INFORMATION

General

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 material 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 operation are described below. Refer to the wiring diagrams (Figure 22, Page 22 & Figure 23, Page 23) and the low voltage field wiring diagram (Figure 28, Page 25).

Heating Mode:

1. On a call for heat 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 roll out switches and blocked vent switch). 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 one blink.
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 ignitor will start its warm-up. After 30 seconds of ignitor warm-up the gas valve (24 VAC) will open. The ignitor circuit stays energized for 6 seconds after the gas valve opens.

7. The furnace control must prove flame via the flame sensor six seconds after the gas valve opens. If flame is sensed, all burners are on and the ignitor 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.

⚠ CAUTION:

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

⚠ CAUTION:

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

Verify proper operation after servicing.

10. The inducer is de-energized after a 30 second post purge.
11. The furnace control keeps the circulating air blower energized for 120 second (factory set) or 60, 90, or 180 seconds (field adjustable). (See Figure 21.)
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 induced draft motor will run through post purge. 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.

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 there any manual reset switches open?
7. Is the filter dirty or plugged?
8. Is the flame sensor coated? (Remove and clean with steel wool.)

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 19.) 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 button on the flame roll out switches. (See Figure 19.) If the furnace operates after depressing the reset buttons, contact a qualified serviceman to identify and repair the problem.

Twinning of Two Furnaces

The control board on a G6 series furnace is capable of being twinned to another G6 furnace. The thermostat wires and the 3/16 inch quick-connect terminals marked "TWIN" on the furnace controls must be connected together for twinning. (See Figure 18.)

NOTE: Components are listed in order of sequence of operation.

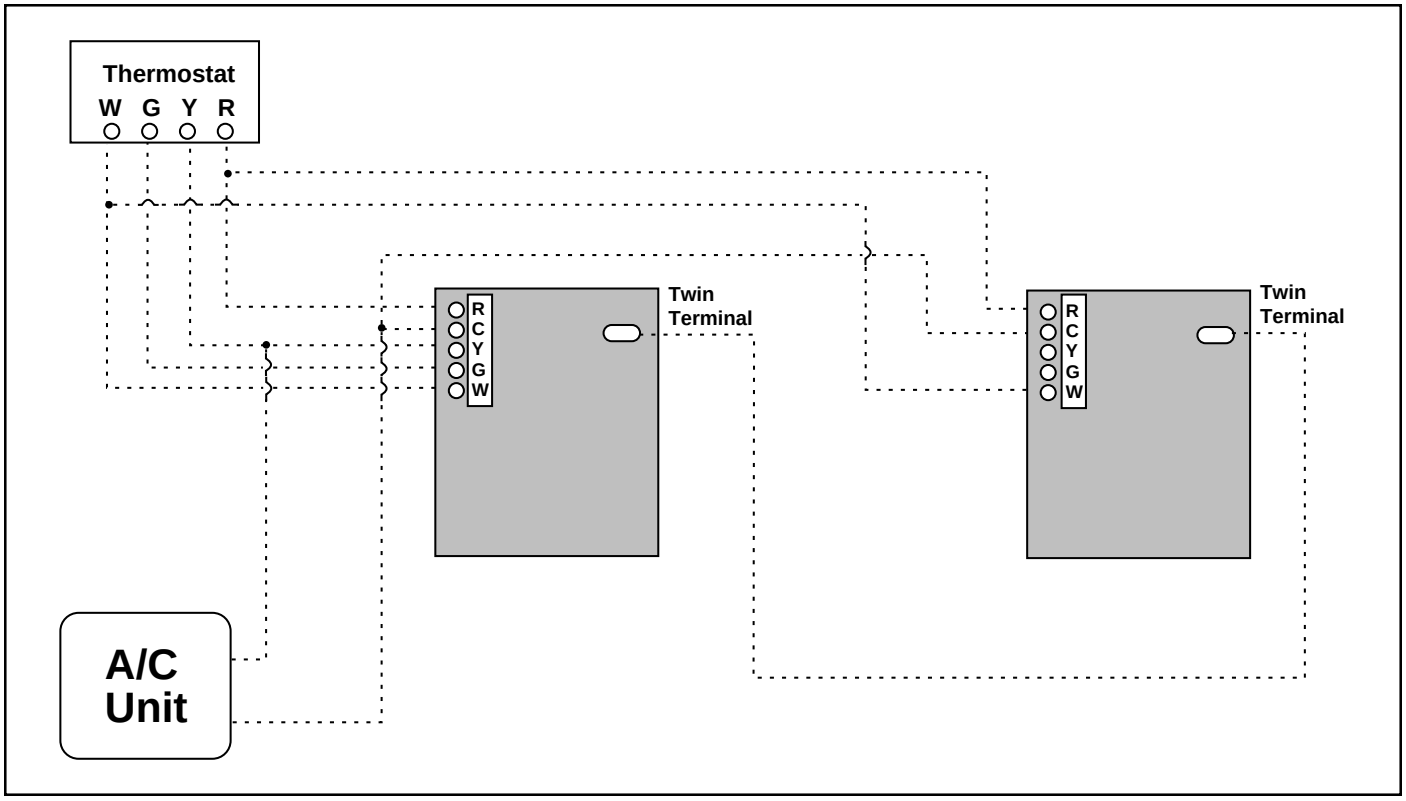
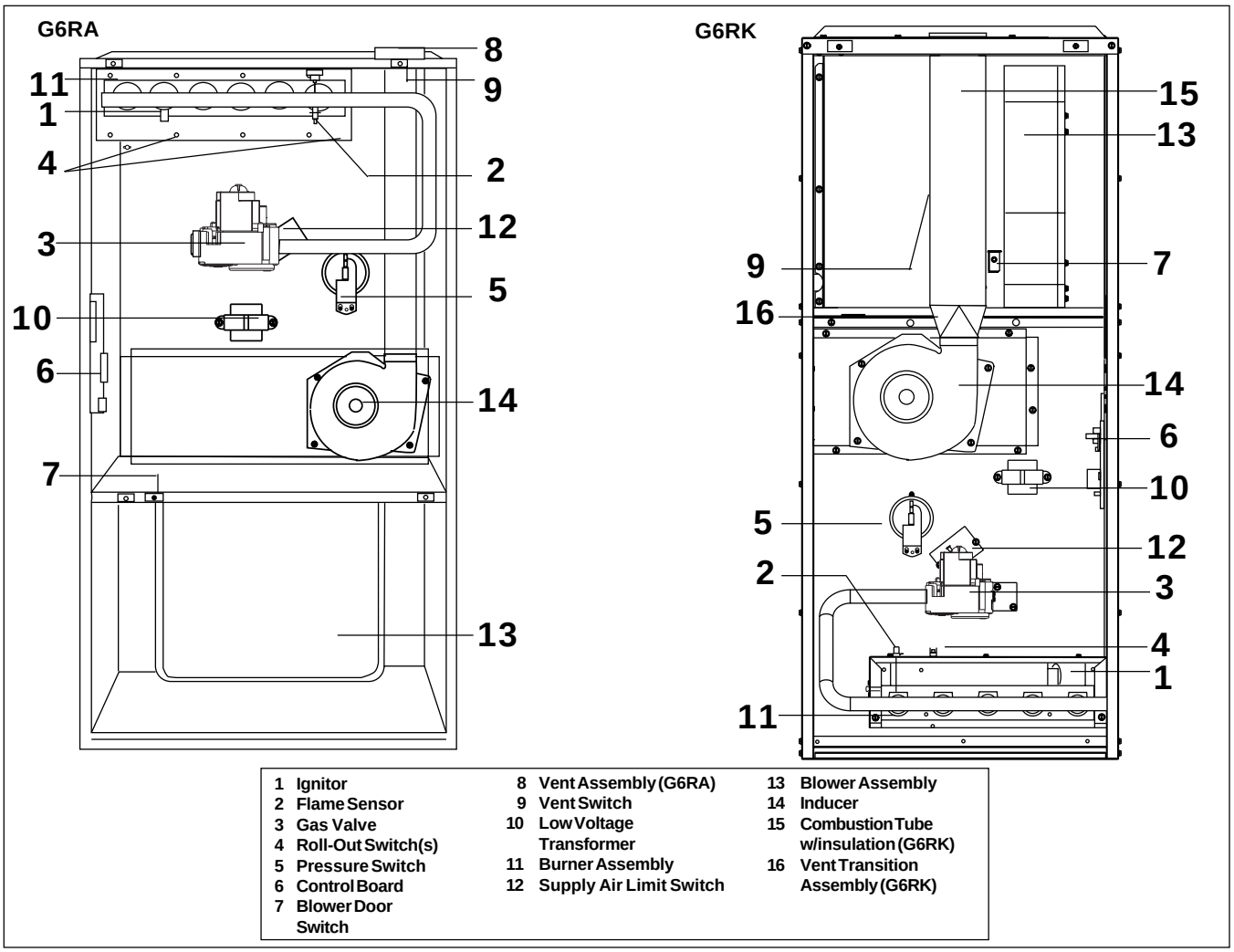


Figure 18. Twinning



1	Ignitor	8	Vent Assembly (G6RA)	13	Blower Assembly
2	Flame Sensor	9	Vent Switch	14	Inducer
3	Gas Valve	10	Low Voltage Transformer	15	Combustion Tube w/insulation (G6RK)
4	Roll-Out Switch(s)	11	Burner Assembly	16	Vent Transition Assembly (G6RK)
5	Pressure Switch	12	Supply Air Limit Switch		
6	Control Board				
7	Blower Door Switch				

Figure 19. Component Parts

Line Voltage Wiring (See Figure 15)

The line voltage (115 volt) to the furnace must be supplied from a dedicated circuit containing the correct fuse or circuit breaker for the furnace. See Table 5. An electrical switch should be readily accessible from and within sight of the furnace. All line voltage connections must be made within the furnace, or in a junction box.

The furnace cabinet must have an uninterrupted, unbroken ground to minimize injury should an electrical fault condition occur. The controls used in this furnace also require an earth ground to cooperate 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 furnace junction box. The G6 series furnaces will not operate unless polarity and ground are properly connected. (See Figure 24.)
Never use gas lines as ground.

To determine polarity, the incoming power supply should be checked. The "Hot" lead will read 115V to ground. The "neutral" should read 0V to ground.

Supply Voltage

Supply voltage to the furnace should be nominal 115 volts. It must be between 103 volts and 127 volts. Supply voltage to the furnace should be checked with furnace in operation. Voltage readings outside the specified range can be expected to cause operating problems. Their cause MUST be investigated and corrected.

Furnace Model Number	Furnace Input (Btu/hr)	Cabinet Width (in.)	Nominal Electrical Supply	Maximum Operating Voltage	Minimum Operating Voltage	Maximum Furnace Amperes	Minimum Wire Gauge	Maximum Fuse or Circuit Breaker Amps**
G6R(A,K)								
045(*)-08	45,000	14.25	115-60-1	127	103	4.9	14	15
060(*)-12	60,000	14.25	115-60-1	127	103	8.9	14	15
072(*)-12	72,000	14.25	115-60-1	127	103	8.9	14	15
072(*)-16	72,000	19.75	115-60-1	127	103	11.3	14	15
096(*)-12	96,000	19.75	115-60-1	127	103	8.9	14	15
096(*)-16	96,000	19.75	115-60-1	127	103	11.3	14	15
096(*)-20	96,000	22.50	115-60-1	127	103	15.3	12	20
120(*)-16	120,000	19.75	115-60-1	127	103	11.3	14	15
120(*)-20	120,000	22.50	115-60-1	127	103	15.3	12	20
144(*)-20	144,000	22.50	115-60-1	127	103	15.3	12	20

Thermostat Wire Gauge	Recommended 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 5. Electrical Data

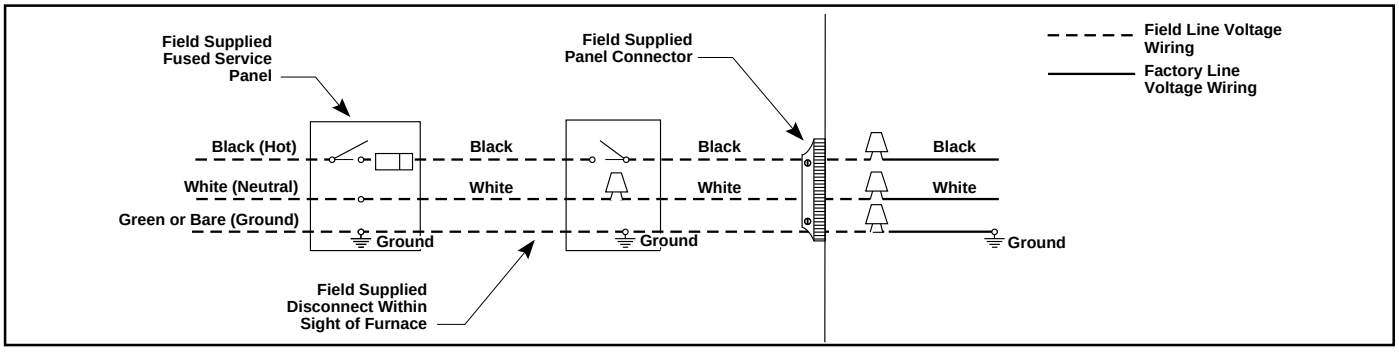
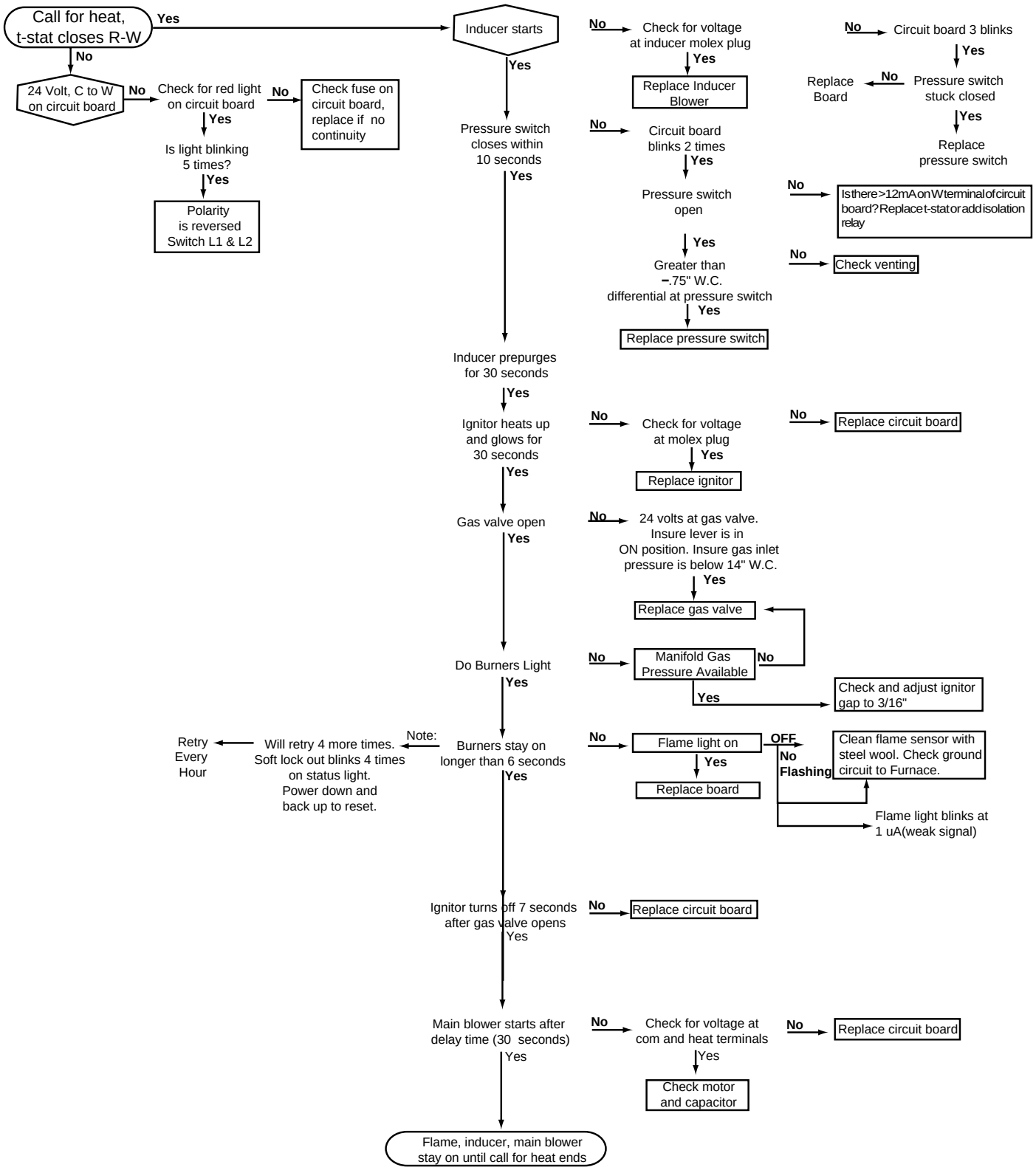


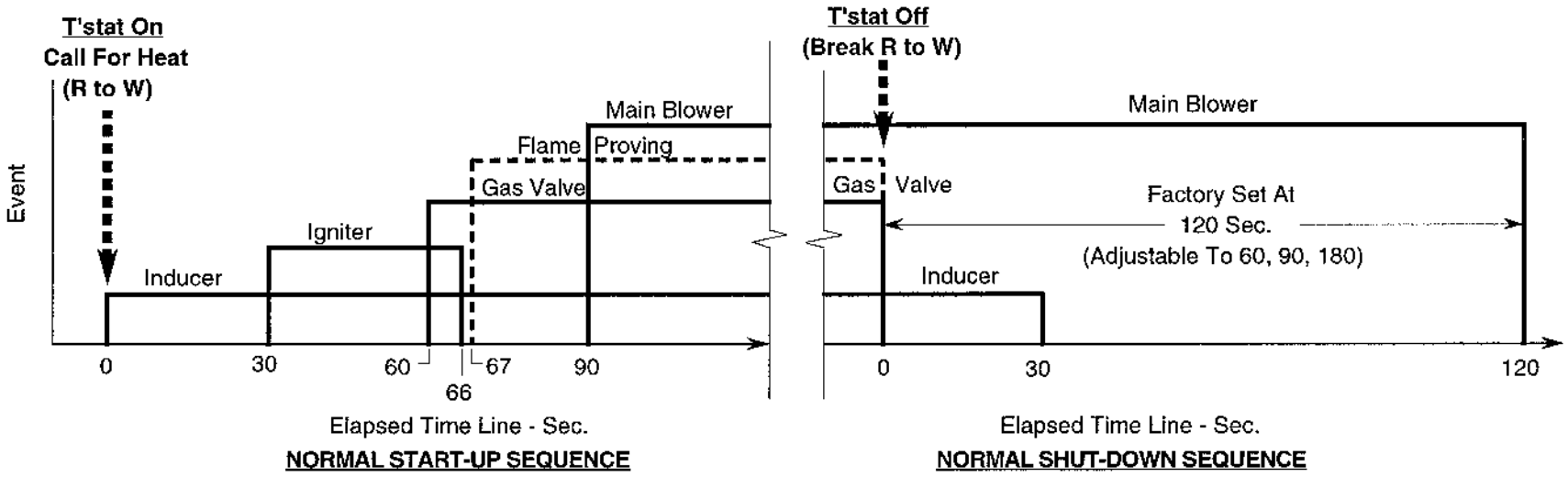
Figure 20. Line Voltage Field Wiring

Troubleshooting Flow Chart

Use in conjunction with time sequence and wiring diagrams that follow.



UTEC G6-FURNACE CONTROL SEQUENCE
Start-up / Shut-Down



Normal Start-up:

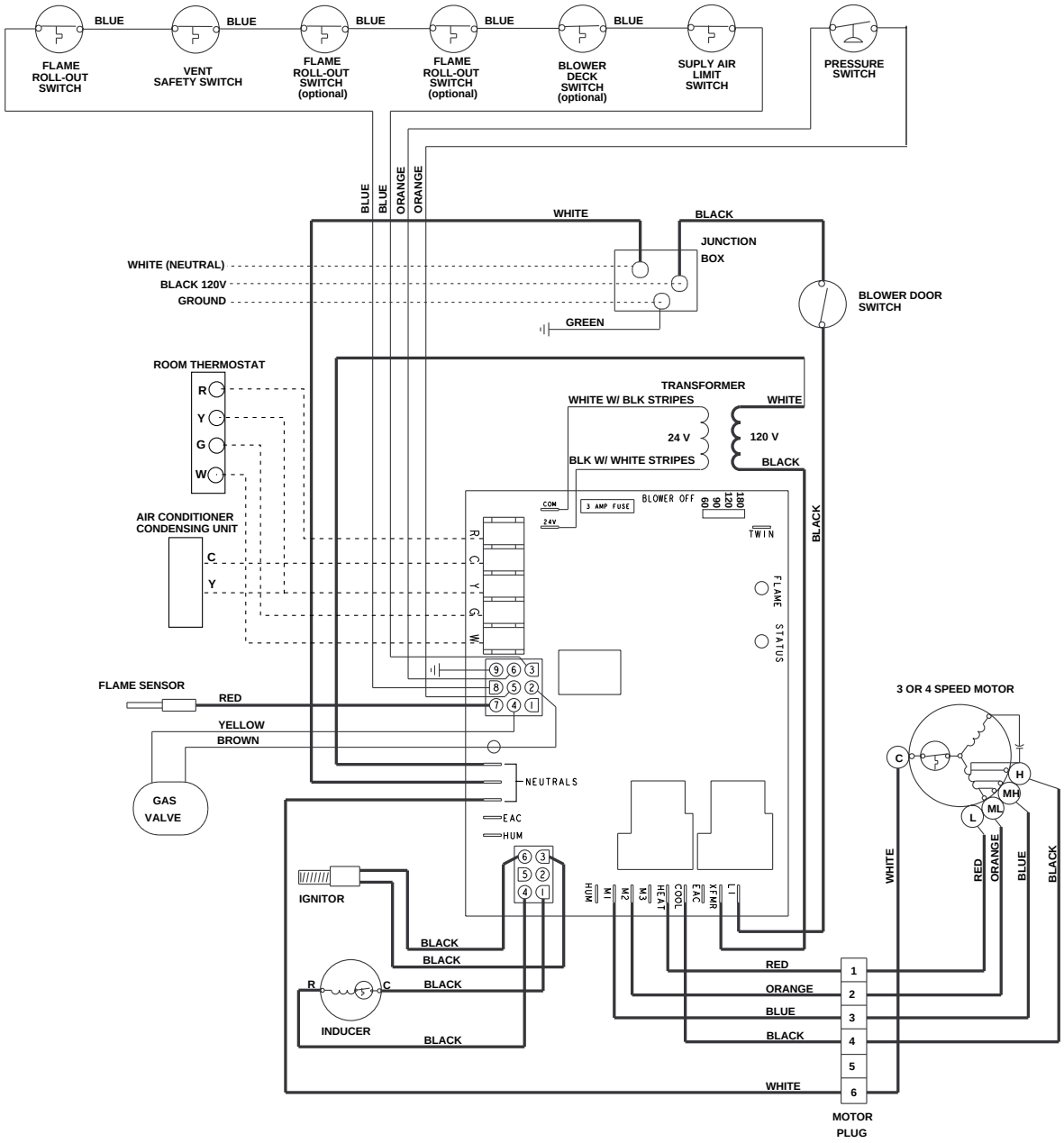
1. **Close R to W circuit. The inducer motor is energized.**
2. **After a 30-second pre-purge the igniter is energized.**
3. **After a 30-second heat-up period the gas valve is energized (the igniter remains on during the first 6-seconds. The gas valve will be de-energized at 7-seconds if flame is not proved).**
4. **After 30-seconds the main blower is energized (Total elapsed time is 90 sec.).**

Normal Shut-down:

1. **Break R to W circuit. The gas valve is immediately turned off.**
2. **After 30-seconds the inducer is turned off.**
3. **After 90-seconds the main blower is turned off (120-seconds after gas valve).**

Figure 21. UTEC Control Sequence

For G6RA Residential Furnaces



FAULT CONDITION	STATUS RED LIGHT
Power On	ON
Limit Circuit Open	1 FLASH
Pressure Switch Stuck Open	2 FLASHES
Pressure Switch Stuck Closed	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.

Legend

Field Wiring	- - - -
Factory Wiring:	
Low Voltage	———
High Voltage	———

WD#703768

Figure 22. G6RA Integrated Control Board System Diagram

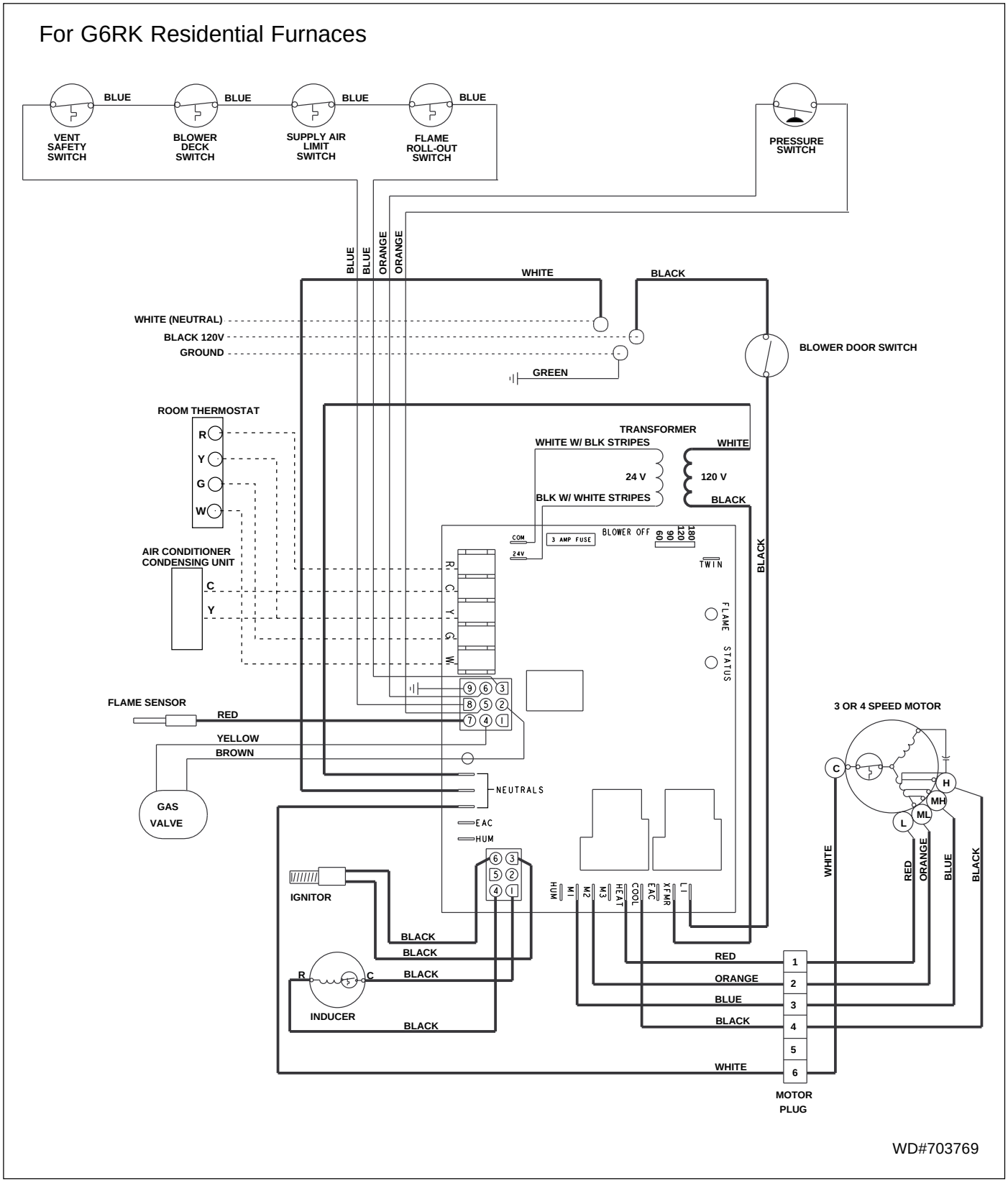


Figure 23. G6RK Integrated Control Board System Diagram

Polarity may be verified as follows:

1. Turn power supply **"ON"**
2. Using a **Voltmeter** check for voltage between the **Hot** (Black) and **Neutral** (White) wire of supply circuit.
3. Reading should be **Line** (Supply) **Voltage.**
4. Check for Voltage between the **Neutral** (White) wire and **Ground** wire of the supply circuit.
4. Reading should be **zero Volts.** (if line voltage is read, polarity is reversed)
5. A zero Volt reading indicates there is no voltage potential on Neutral wire.
6. Double check by checking for voltage between the **Hot** (Black) wire and **Ground** wire of the supply circuit.
7. Reading should be **Line** (supply) **Voltage.** (if zero volts is read, there is no ground, or polarity is reversed.)

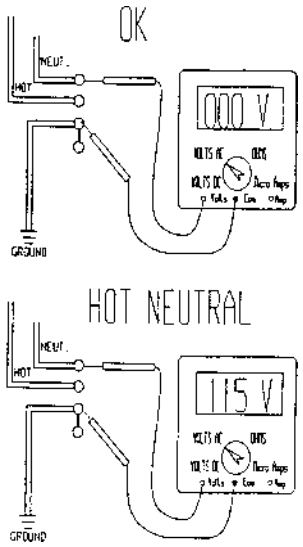


Figure 24. Polarity and Ground

Polarity and Ground

The G6 furnace will not operate if loss of ground occurs. Every effort should be made at the installation to provide a good ground. If old 2-wire romex exists it should be replaced with a 2-wire w/ground. A cold water line could be used provided that the connection or grounding occurs before any di-electric fittings and provided no plastic pipe is used inside or outside the building.

Blower Door Switch

The blower door switch is located near the center of the furnace. (See Figure 25.) The switch is normally open and closes with the proper installation of the bottom door of the upflow models or top inside blower door on downflow models.

Its purpose is to break the 115 vac power supply when the door is removed exposing the blower.

Check-out procedure (using ohm meter).

1. Turn off incoming power supply.
2. Disconnect the wires on the switch.
3. With the switch at rest, no continuity should be read.
4. Now depress the switch plunger, the OHM meter should show continuity or 0 ohms. If not, replace switch.

The switch can also be checked with the 115 vac power supply on. If the switch is manually depressed and 115 vac is read across it, then the switch is bad and must be replaced.

Transformer (See Figure 26)

The transformer supplies control voltage (24 vac) by stepping down the supply (primary) voltage from 115 vac to 24 vac (secondary voltage). Transformers are rated by VA. VA is the volt/amp or total wattage the secondary can handle. When a transformer is replaced the VA should be of an equal or greater value.

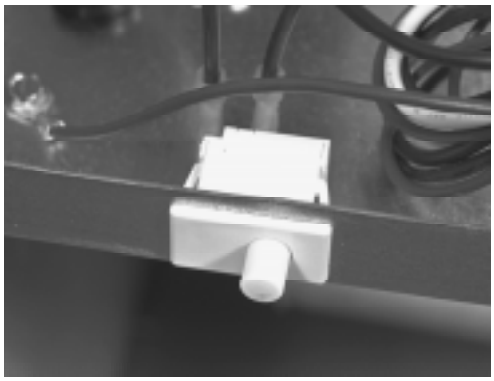


Figure 25.

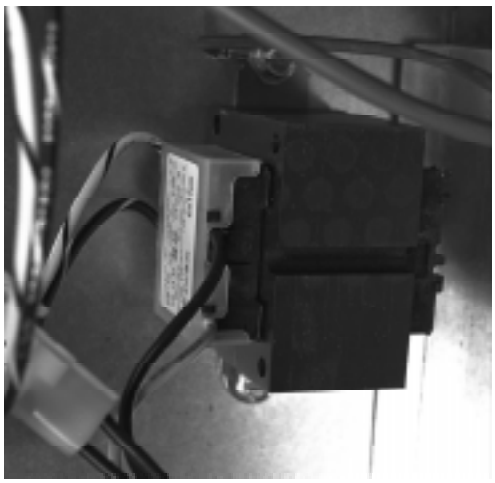


Figure 26.

Check-out procedure:

1. Using a volt/ohmmeter on at least 115 vac scale.
2. Measure the voltage on the control board terminals "XFMR" & "NEUTRAL".
3. If voltage is 115 vac measure the voltage at terminals marked "24 vac" & "Com" located in the center of the control board.
4. If 115 vac is measured at "XFMR" & "NEUTRAL" but no voltage is present at "24 vac" & "Com" replace transformer.

Transformers open on primary indicate low voltage short circuit. Transformers open on secondary indicate an overload (a current draw that exceeded rating).

Low Voltage Wiring

Figure 27.

Install the thermostat per the manufacturer's instructions. The low voltage (24 vac) connections from the thermostat are made at the terminal strip on the control board in the furnace. See Figure 23 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 5, on page 19.

The thermostat must not be installed on an outside wall or any other location where its operation may be adversely affected. Adverse effects 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:

Jump out R to W at thermostat with 10 Loop Helix and measure current draw after blower starts. Divide by 10. Example: 4 Amps = .4 set at .4.

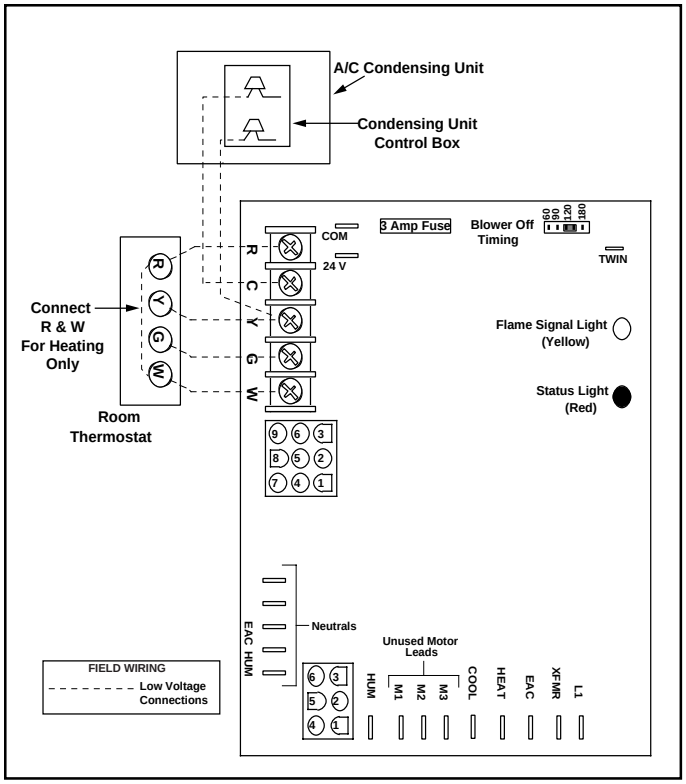


Figure 28. Low Voltage Field, Four-wire Heating/Cooling Applications

OR

Set the heat anticipator at approximately .5.

Control Board (See Figure 24)

The control board is manufactured by UTEC. This control manages all furnace functions. It also serves as a diagnostic tool if the furnace should malfunction.

Features:

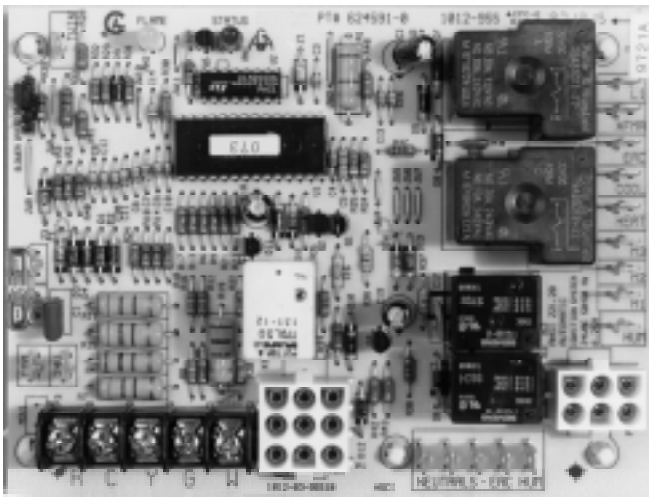


Figure 29.

A. 90 second delay blower "off" time in cooling mode.
B. Low Voltage Fuse - an over-current, short circuit safety device designed to protect the control board in the event of a low voltage short or over-current. (See Figure 30.)
C. Field Adjustable Fan Settings (Heating Mode)

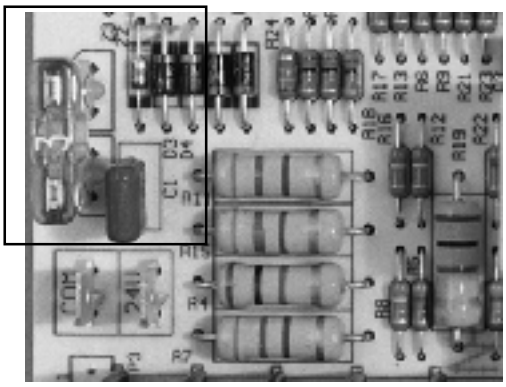


Figure 30.

The off times are field adjustable and may be set from 180, 120, 90, 60 seconds; 120 being set from the factory. To change the off-time, remove jumper pin and replace it on the desired time. Time-on is fixed at 30 seconds. (See Figure 31.)

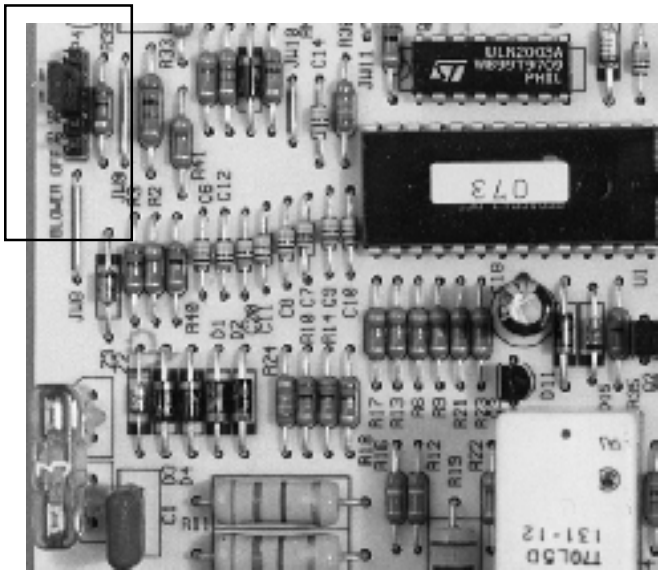


Figure 31.

D. Humidifier & Electronic Cleaner Tap - Both taps are rated at 1 amp and have an output voltage of 120 VAC. All humidifiers and electronic air cleaners should be installed per the installation instructions the manufacturer supplied with their equipment. (See Figure 32.)

Note: A 24 volt humidifier solenoid coil must not be wired across the "W" and "C" terminal. This will interfere with the operation of the control board and may influence the heat anticipator in the thermostat.

Figure 32.

E. Twinning Terminal - The function of twinning is to insure simultaneous blower operation on two furnaces. The G6 series is twinning ready. The 3/16" quick connect terminal on the board must be connected to the other furnace control. The thermostat wiring is provided in the diagram. See Figure 33 for location and Figure 18 on page 18 for Twinning Diagram.

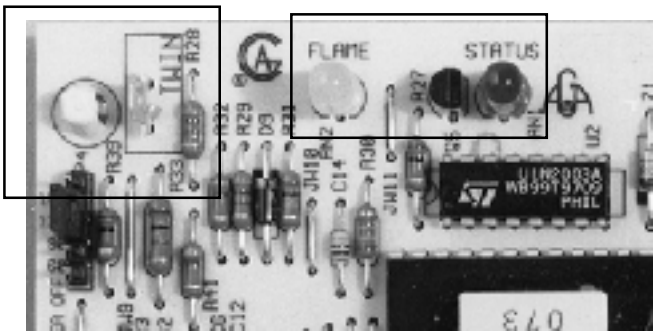


Figure 33.

F. Diagnostic Lights - the diagnostic light feature is to aid the service technician in identifying the nature of the problem. See Figure 33.
   1. Red Status Light. An explanation of the flash code may be seen on the inside of the door. Note: The light must be observed before the bottom door is removed since the board does not store the fault condition in its memory. See Table 6.

   2. Yellow Flame Light. This will come on solid with a flame signal of 1uA or more. The flame light will blink at the point of a weak signal and go out at any reading of .5 uA or less. See Flame Sensor section on page 34.

Fault Condition	No. of Flashes	Status of Furnace	Fault Clearing
No Fault	LED on	Normal	-------
Limit Circuit open	1	Main Blower & Induced Draft Motor running	Limit Circuit closes
Pressure Switch stuck open	2	Induced Draft Motor running	Pressure Switch closes
Pressure Switch stuck closed	3	Unit does not operate	Pressure Switch opens
Ignition Failure (Unit will try 5 times for ignition)	4	Unit does not operate	Auto-reset after one hour
Polarity or Ground	5	Unit does not operate	Reverse Polarity, Reestablish Ground
False flame or Gas Valve Relay Shorted	Continuous Flash	Both fans operate	Main Power or Thermostat resets
Power Off	LED off	-------	-------

Table 6. Status Light Conditions

High Limit Controls

The G6 (RA/RK) series incorporates 3 different types of limit controls: (See Figure 34) a main limit control which is located in the heat exchanger front panel, a vent limit control located on the inducer housing, and 1 roll out switch on top of the burner box on G6RK. G6RA will have one on the left side, one on the right side, and one on top of the burner box.

All limits are in series with each other and are between #3 and #8 pins on the nine pin connector that plugs into the control board. Limit controls are normally closed switches, that open thermostatically to prevent furnace operation in unsafe temperature conditions.

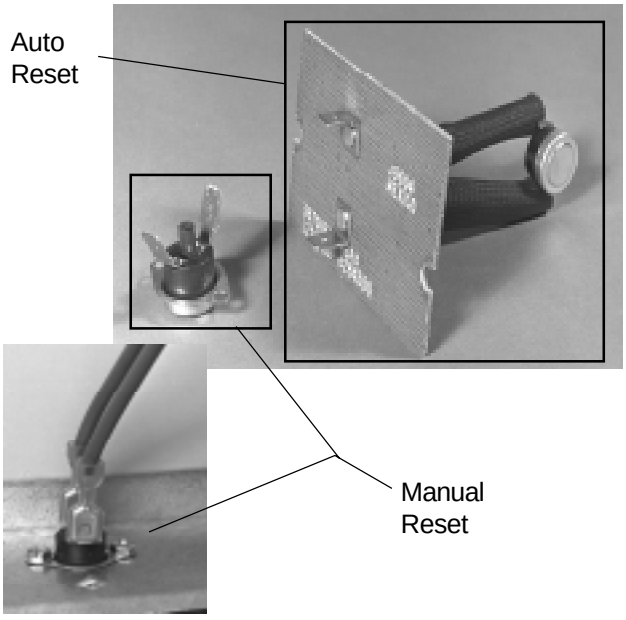


Figure 34.

Main Air Limit Control (See Figure 35)

The main limit control is an automatic reset type. It reacts to abnormally high air temperatures in the heat exchanger area. If the main limit opens, the gas valve is de-energized and the induced draft and main blower motors continue to run. The main limit will automatically reset after the temperature is reduced.

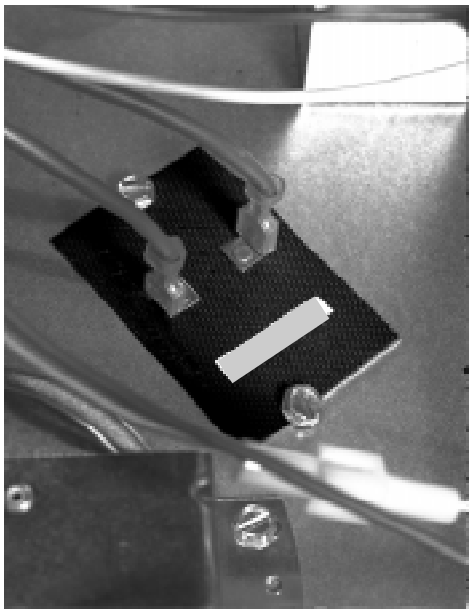


Figure 35.

Check-out Procedure:

1. Shut off power to furnace.
2. Remove wires from limit (Be sure furnace has removed any heat surrounding switch).
3. Check for continuity across switch.
   a. If continuity is present, switch is closed and assumed good.
   b. If continuity is infinite, the limit is open and should be replaced.*

*Limits should be replaced with their exact replacement.

Check-out can also be performed using a voltmeter:
   a. Put meter on at least 24 vac scale.
   b. A voltage reading across the switch indicates an open switch if there is voltage present at the switch.

Possible causes for Main Limit Tripping:

1. Dirty filter
2. Dirty cooling coil
3. Oversized furnace
4. Restrictive duct system
5. Main blower failure
6. Improper speed selection
7. Over-firing of furnace (gas pressure too high)
8. Main or induced draft motor cycling on internal overload

Vent Limit Control (See Figure 35A)

The function of the vent limit switch is to sense the heat from the flue gas in the event the vent system becomes blocked or restricted.

Check-out Procedure: Same as for main limit switch.

Possible causes of vent switch tripping:

1. Blocked vent system.
2. Improper installation of special vent systems.
3. Inadequate combustion air. Furnace may be operating in a space classified as "confined." Consult Section 2 of this service manual.

Figure 35A.

Roll Out Limit Control (See Figure 36)

The function of a roll out switch is to sense any flames backing out of the heat exchanger tubes. They are normally closed and are manually reset.

Check-out Procedure:

1. Shut off power supply to furnace.
2. Remove wires from roll out switch.
3. Using an ohmmeter, check out continuity across switch.
4. An infinite reading indicates an open switch.
5. Depress reset button to reset switch.
6. Continuity or 0 ohms should now be read. If not, replace switch.

Possible causes of roll out switches tripping:

1. Blocked heat exchanger (sooted)
2. Loose heat exchanger tube
3. Burner misaligned
4. Supply air interfering with flame patterns
5. Overfiring/too high gas pressure
6. Insufficient combustion air

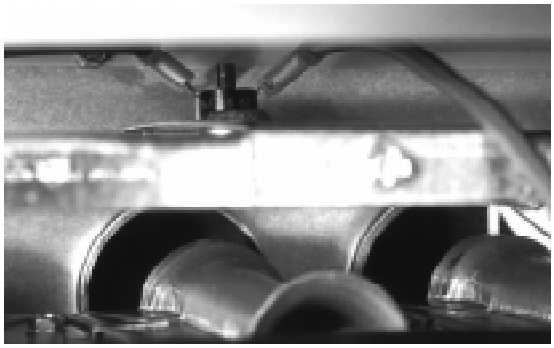


Figure 36.

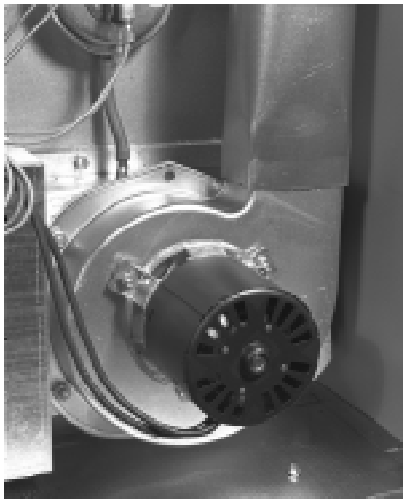


Figure 37.

Figure 38.

Draft Inducer Motor (See Figure 37.)

All models use an induced draft combustion blower mounted on the outlet of the heat exchanger. Its purpose is to establish a draft (flow) through the heat exchanger, to insure that all flue products are carried outside the structure via the vent pipe. (See Figure 40.) The blower is driven by a 115V permanent split capacitor motor. The same (part #) blower is used on all models of all series.

Check-out Procedure:

1. Disconnect Molex plug between control board and motor.
2. Using the appropriate scale on a volt meter, insert probes into plug coming from control board.
3. Establish call for heat.
4. If voltage is read, check fan capacitor. If fan capacitor is okay, replace motor. (See Figure 38.)
5. If no voltage is read, replace control.
6. Check for debris in wheel preventing it from turning.

Pressure Switch

The pressure switch verifies that the inducer is drawing the combustion gases through the heat exchanger. (Figure 39.)

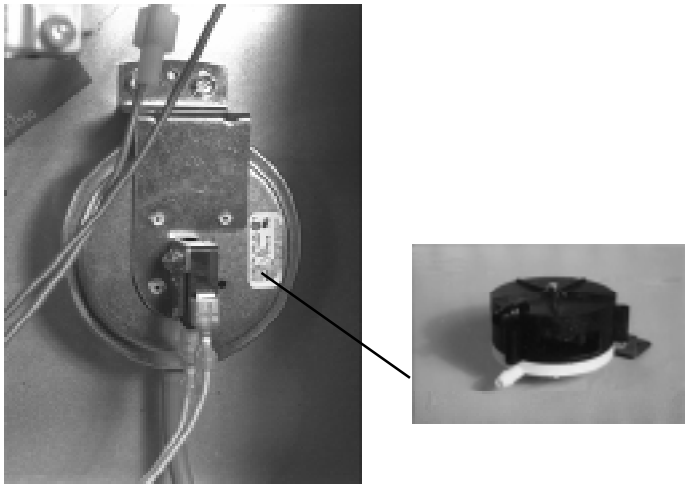


Figure 39.

Once the ventor motor builds up to speed, and under normal operation conditions, sufficient (negative) pressure will be created to close the pressure switch, and keep it closed for the whole heating cycle. Under abnormal conditions, such as ventor motor failure or restricted vent pipe, or leak around ventor assembly, sufficient negative pressure will not be created. This condition will cause a 2 flash fault code on the board and ignition will not take place.

Under most circumstances, when the pressure switch is not closing, sufficient (negative) pressure is not being created.

To test for proper negative pressure, install a negative pressure gauge (magnehelic or equivalent) or U Tube as shown in Figure 41. Follow check-out procedure. If sufficient negative pressure is being created, reading is steady, and vacuum hoses are clear, replace pressure switch. If sufficient negative pressure is not being created, look for problems described in Table 8.

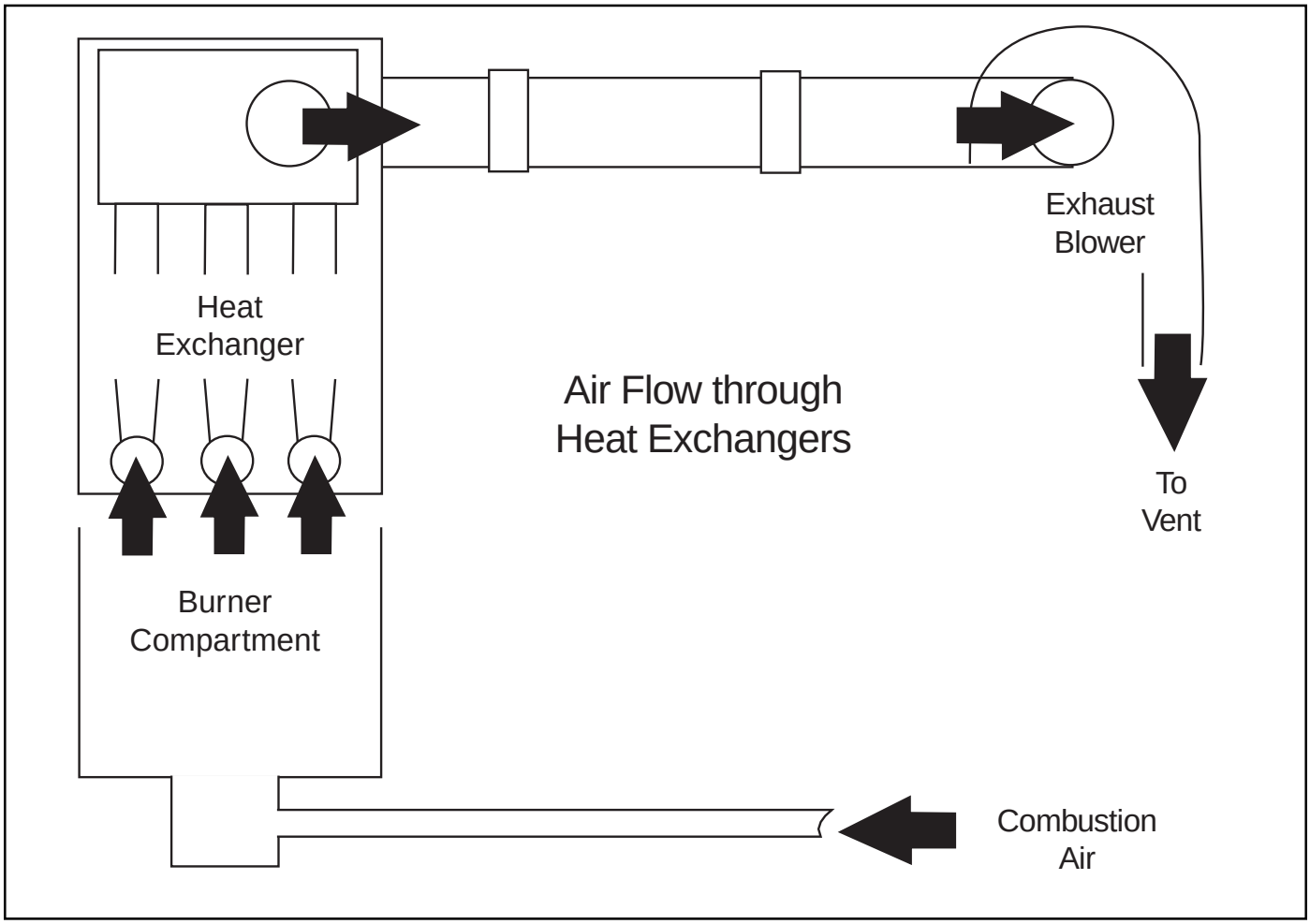


Figure 40.

Settings		Application	Nordyne Part #	Switch Type
Open	Close			
-0.55	-0.75	80+ upflow	632212	atm.-single port (NO)
-0.55	-0.75	80+ downflow	632212	atm.-single port (NO)

***G6RD vent pressure switch is normally closed**

Table 7.

Check-out Procedure:

1. Remove orange wires from pressure switch. Place a tee in the hose connecting pressure switch to the inducer housing.

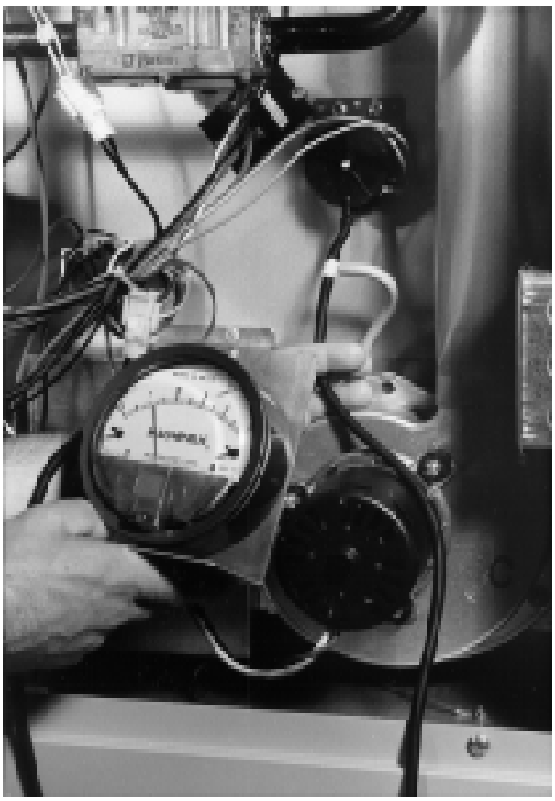


Figure 41.

2. Connect a Differential Pressure Gauge or Inclined Manometer to tee.
3. Start induce draft motor.
4. Negative pressure created by the induced draft motor must be greater than 0.75" W.C. for switch to close. (See Table 7.)
5. Use an ohmmeter to check for continuity across switch.
6. If continuity is established, switch is closed. If ohmmeter shows an infinite reading, switch is open, and must be replaced.

If the pressure reading will not pull down to 0.75" W.C., then there could be several reasons why:

1. Vent blockage.
2. Heat exchanger blockage.
3. Poor seal on collector box to induced draft motor.
4. Bad blower wheel in induced draft motor.
5. Crack or hole in heat exchanger.

The switch must be open to be ready for the next heating cycle. If switch remains closed, a flash code of 3 will be produced by the control board.

Lower (Lesser) Negative Pressure Than Closing Pressure
Lower than normal negative pressure measured at the combustion blower may be caused by:
1. Restriction on outlet side of combustion blower (blocked flue, debris or venting not properly supported or sloped)
2. Leak (lack of restriction) on inlet side. Inducer inlet leaking, inducer blower wheel loose, or leak in heat exchanger.
3. To test for restriction in vent pipe to verify problem is outside of furnace, disconnect vent for test period only and start furnace. If furnace starts, look for problem in vent pipe. Reconnect after testing.

Table 8. Lower (Lesser) Differential Negative Pressure Than Closing Pressure

Hot Surface Ignitor (See Figure 42.)

The hot surface ignitor is helical in shape and is located approximately 3/16" in front of the burners. Its function is to ignite fuel at the appropriate time in the sequence. The hot surface ignitor used by NORDYNE is manufactured by CARBORUNDUM.

NOTE: Special care should be taken when handling the ignitor. You should never touch the ignitor surface. Grease or dirt from your hands will shorten the ignitor's life.

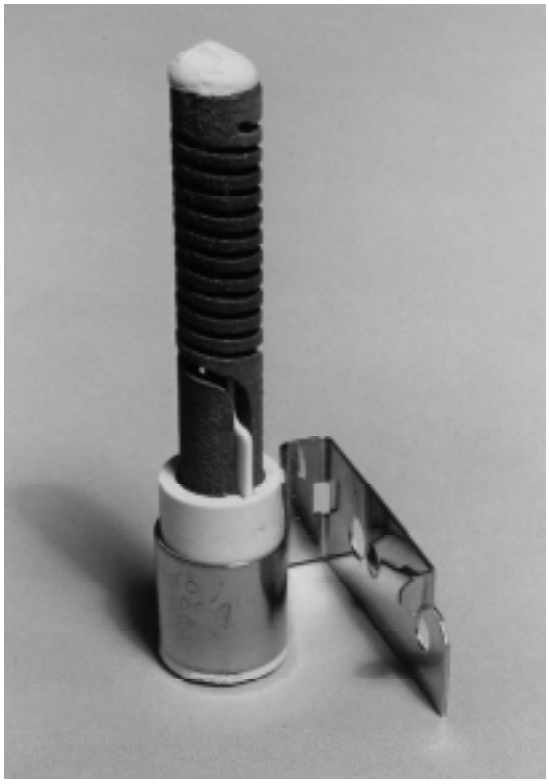


Figure 42.

Check-out Procedure:

1. Unplug ignitor from 2-prong plug.
2. Place a voltmeter on the proper scale (at least 115 vac).
3. Establish a call for heat.
4. After approx. 30 seconds of induced draft motor operation, the ignitor should see line voltage.
5. If voltage is present, replace the ignitor. (See Figure 43.)
6. If no voltage is present, replace control board.
7. The ignitor may also be ohmed out. The ignitors usually range from 125 to 150 ohms at 70°F/21°C. (See Figure 44.)
8. Be sure when replacement ignitor is installed that it is approximately 3/16" from the burners. Mishandling and misalignment are reasons why the ignitor could fail.

Figure 43.

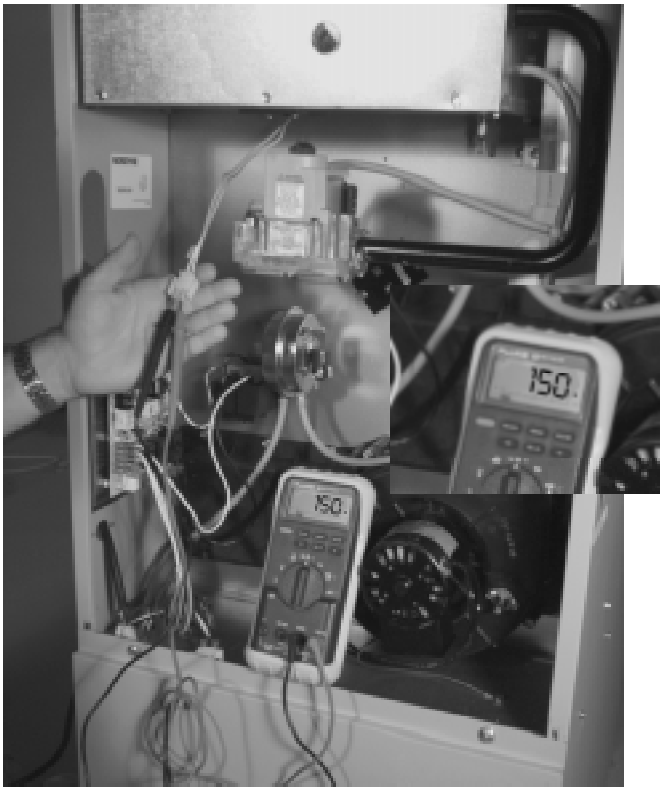


Figure 44.

Gas Valve (See Figure 45.)

The G6 series furnaces use Honeywell valve VR8205A2008. Gas valves are 24 vac operated. There are ports on the valves to read incoming supply pressure and manifold or burner pressure. Supply pressure for natural gas should be 5-7" W.C. LP gas should be 11-13" W.C. Manifold pressure for natural gas should be 3.2" W.C. (see Figure 46) and LP gas should be 10" W.C. (see Figure 45).

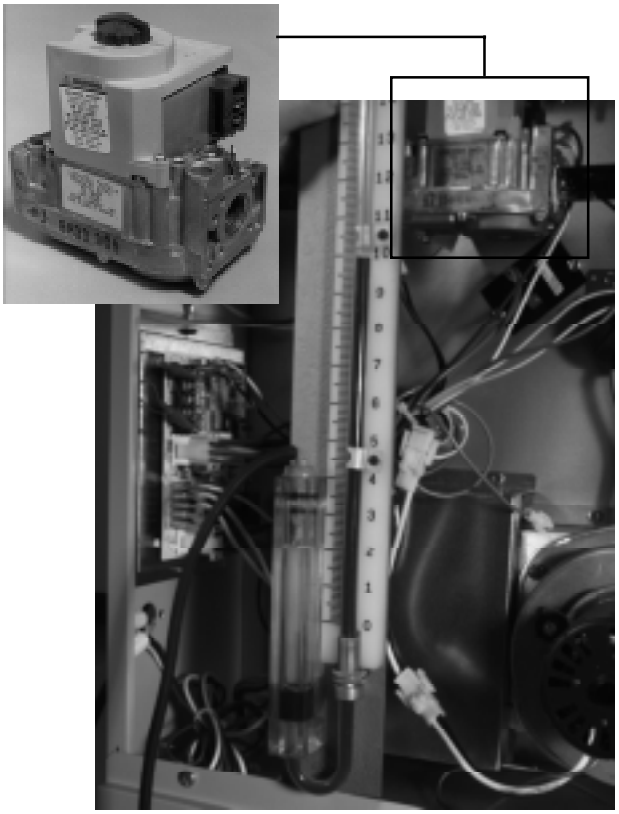


Figure 45.

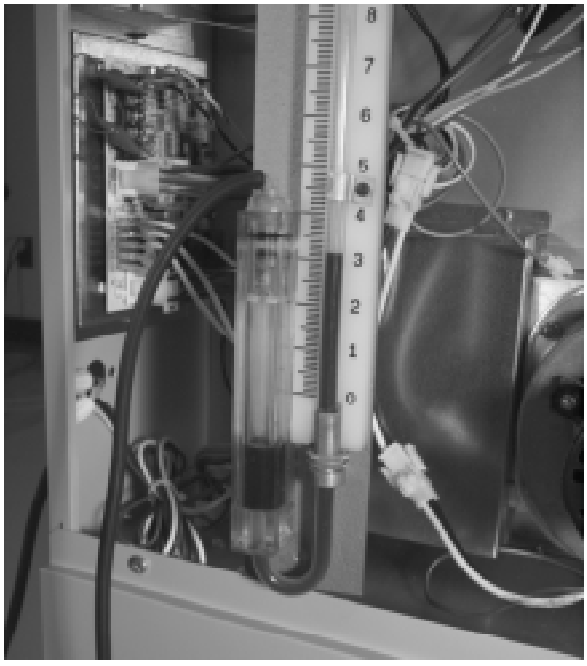


Figure 46.

Check-out Procedure

1. By using a volt meter on a 24 volt scale, position the probes at the gas valves.
2. Establish a call for heat.
3. After furnace has operated for approximately 60 seconds, the gas valve receives 24 vac from the control board. (See Figure 47.)
4. If gas valve does not open, verify gas inlet pressure is available and not above 14" W.C., then replace valve. **Note:** High inlet gas pressure will lock down valve.
5. Voltage may also be checked at the control board.
6. If voltage is not available at the control, replace control.

Gas valves have a resistance of 1.9 to 2 mega ohms. This coil may be open or shorted.

Figure 47.

Adjusting Manifold Pressure

1. With gas valve in the off position, remove the outlet pressure cap screw using a 3/16" Allen wrench.
2. Connect a U-tube manometer or gauge to read pressure.
3. Turn on gas valve and establish call for heat.
4. Read pressure on U-tube manometer or gauge.
5. Adjust pressure as necessary:
   a. 3.2" W.C. for natural gas
   b. 10" W.C. for LP gas
6. If an adjustment is needed, remove pressure regulator cap. Turn the adjustment screw clockwise to increase pressure and counterclockwise to decrease pressure.
7. Replace regulator cap and shut off valve to remove U-tube or gauge. Reinstall pressure cap screw.

Flame Sensor (See Figure 48.)

The flame sensor is located in front of the first burner. After the burners are ignited, flame is proven through the flame sensor by flame rectification. The sensor is an alloy consisting of aluminum, chromium, and iron. This alloy is commonly known as Kanthal D.

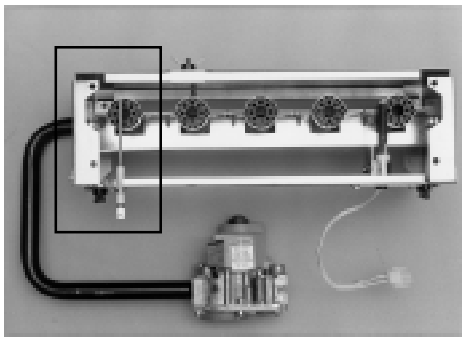


Figure 48.

Check-out Procedure:

1. Use a micro amp meter or the micro amp setting on a digital volt/ohmmeter to measure the flame current signal. (uA scale.)
2. Disconnect flame sensor at the push-on connector below the burner assembly.
3. Put meter probes in series with flame sensor connectors.
4. Establish a call for heat.
5. After flame is established, note micro amp reading.
6. A strong signal is 3 to 4 uA. (See Figure 49.) The board will close the gas valve if the micro amp reading is less than 0.5 uA.

Figure 49.

7. To aid in troubleshooting, the ignition control has a yellow flame signal light. If the light is on, flame signal is at 1 or higher micro amps. If the light is blinking, signal is below 1 uA and is weak.

Reasons for Poor Micro Amp Readings (See Figure 50.)

1. Dirty flame sensor.
2. Poor positioning of flame sensor.
3. Poor ground on furnace.
4. Low gas pressure.
5. High gas pressure.

Figure 50.

Studies have shown that silicone oxides may accumulate on the sensor. It is important that the furnace operates in an environment which is conducive to proper furnace operation. These oxides can be removed by brushing with steel wool.

Heat Exchanger and Its Components

The G6 uses a tubular type of heat exchanger made from aluminized steel. (See Figure 51.) Inside the heat exchanger are the tubulators, located in the last passage of each tube, behind the collector box. They help in the efficiency of the combustion process. (Figure 52.)

Figure 51.

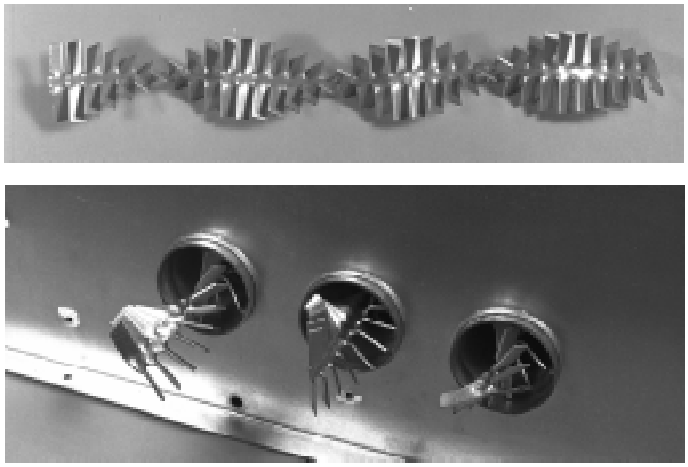


Figure 52.

BLOWER PERFORMANCE

Proper Airflow - Checking Temperature Rise. (See page 7.) A temperature rise may be taken across the furnace by checking the temperature of the supply duct and subtracting the return air temperature.

If the temperature rise is too high, air flow must be increased by increasing blower speed or removing any restriction to airflow. If temperature rise is too low, air flow is too great. Reduce air flow by using a low speed on the blower.

Causes for excessive temperature rise:

1. Dirty air filter
2. Oversized furnace (undersized duct)
3. Blower speed too low
4. Dirty evaporator coil
5. Overfired furnace due to too much gas pressure

FLUE GAS TEMPERATURE

The G6 series furnaces flue gas temperature range is between 300°F and 325°F Make a small hole in vent pipe, as close to furnace as possible. Insert temperature probe and note temperature.

Possible causes for high flue gas temperatures:

1. Too much gas pressure
2. Not enough air flow across furnace

Low flue gas temperatures may be attributed to:

1. Too little gas pressure
2. Too much air flow
3. Very low return air temperature

After flue gas has been measured, reseal vent pipe.

Natural Gas Pipe Capacity Table (CU.FT./HR.)

Capacity of gas pipe different diameters and lengths in cu. ft. per, hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

Nominal Iron Pipe Size, Inches	Length of Pipe in Feet							
	10	20	30	40	50	60	70	80
1/2"	132	92	73	63	56	50	46	43
3/4"	278	190	152	130	115	105	96	90
1"	520	350	285	245	215	195	180	170
1 1/4"	1,050	730	590	500	440	400	370	350
1 1/2"	1,600	1,100	890	760	670	610	560	530

After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (Btu/hr)}}{\text{Heating Value of Gas (Btu/Ft3)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (Btu/Ft3) may be determined by consulting the local natural gas utility or the LP gas supplier.

LP Gas Pipe Capacity Table (CU.FT./HR.)

Maximum capacity of pipe in thousands of Btu per hour of undiluted liquified petroleum gasses (at 11 inches water column inlet pressure).
Based on a Pressure Drop of 0.5 Inch Water Column).

Nominal Iron Pipe Size, Inches	Length of Pipe in Feet											
	10	20	30	40	50	60	70	80	90	100	125	100
1/2"	275	189	152	129	114	103	96	89	83	78	69	63
3/4"	567	393	315	267	237	217	196	182	173	162	146	132
1"	1,071	732	590	504	448	409	378	346	322	307	275	252
1 1/4"	2,205	1,496	1,212	1,039	913	834	771	724	677	630	567	511
1 1/2"	3,307	2,299	1,858	1,559	1,417	1,275	1,181	1,086	1,023	976	866	787
2"	6,221	4,331	3,465	2,992	2,646	2,394	2,205	2,047	1,921	1,811	1,606	1,496

The Example (LP): Input Btu requirement of unit, 150,000
Equivalent length of pipe, 60 ft. = 3/4"IPS required.

⚠ CAUTION:

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

GAS CONVERSION AND HIGH ALTITUDE DERATE

High Altitude Derate

The nameplate input rating for the furnaces apply for elevations up to 2,000 feet (610m) above sea level. For elevations over 2,000 feet, reduce the input by 4% for each 1,000 feet above sea level. For example, a furnace applied at an elevation of 5,000 feet should be derated by 20%. See Table 10 describing the correct orifice for derate.

NOTE: The density of air decreases with increasing elevation above sea level. This reduces the quantity of combustion air drawn into the furnace under normal operation and requires the unit to be derated by using smaller gas orifices or lower manifold pressure.

Conversion

Conversion of this furnace to utilize LP/propane gas must be made by qualified service personnel, using only factory authorized or approved parts.

Verifying and Adjusting Firing Rate

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

IMPORTANT NOTE:

The firing rate must not exceed the rate shown on the furnace rating plate. At altitudes above 2,000 feet it must not exceed that on the rating plate less 4% for each 1,000 feet.

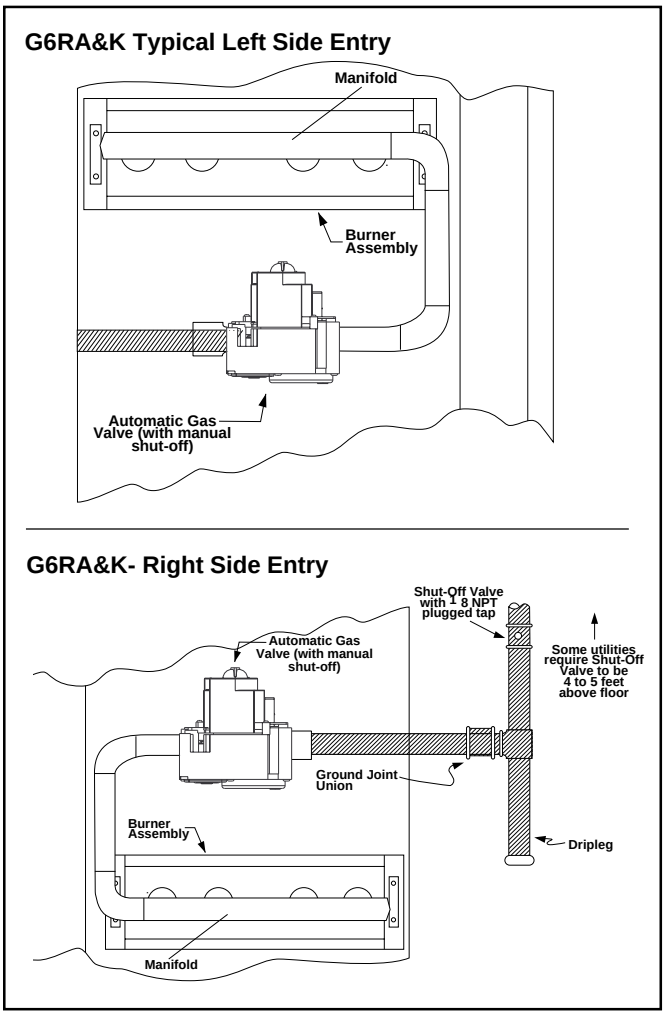


Figure 53. Typical Gas Service Connection

EXAMPLE 1

Elevation	3,890 feet
Type of gas	Natural
Furnace model	G6RA096()16
Orifice as shipped	#42 Drill

What burner orifices are needed?

The required input for 3890 feet is 81,000 Btu/h or 16% less than the sea level rating of 96,000 Btu/h.

See Table 10 for natural gas, find the Furnace Model Number and follow across the table for the elevation 2000-4000 column. From the table, choose a #43 orifice. Install a #43 orifice in every burner and check firing rate per VERIFYING AND ADJUSTING FIRING RATE section. The firing rate in this example must not exceed 81,000 Btu/h.

EXAMPLE 2

Elevation	5,500 feet
Type of gas	Propane
Furnace model	G6RA096()-16
Orifice in Natural to LP Conversion Kit	# 55 drill

What burner orifices are needed?

The required input for 5500 feet is 73,000 Btu/h or 24% less than the sea level rating of 96,000 Btu/h.

Follow the procedure below 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 11.
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 Btu per hour. Example:
   a) Time for one revolution of a gas meter with a one cubic foot dial = 40 seconds.
   b) From Table 11 read 90 cubic feet per hour of gas.
   c) Heating value of the gas (obtained from gas supplier) = 1040 Btu per cubic foot.
   d) Firing rate = 1040 x 90 = 93,600 Btuh.
6. Relatively small adjustments to the firing rate can be made by adjusting the gas manifold pressure.
7. See High Altitude Derate for advice on gas orifice size for installations at elevations more than 2,000 feet above sea level.

The gas valve regulator is set at a nominal value of 3.2" W.C. for use with natural gas. The manifold pressure must be set at 10" W.C. for use with LP/propane gas. 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. When adjusting the firing rate, do not set the manifold pressure more than 0.3" W.C. above or below these pressures. If pressures outside this range are required to achieve the desired firing rate, change the burner orifices.

Furnace Model Number	Furnace Rating Plate Input Btuh	No. of Burners	Elevation 0 - 2000		Elevation 2000-4000		Elevation 4000-6000		Elevation 6000-8000		Elevation 8000-10000	
			Nat	LP	Nat	LP	Nat	LP	Nat	LP	Nat	LP
G(*)RA045C-X	45,000	2	44	54	45	55	46	55	48	56	49	56
G(*)RA060C-X	60,000	3	45	55	46	55	49	56	49	56	50	57
G(*)RA072C-X	72,000	3	43	54	44	55	45	55	46	56	48	56
G(*)RA096C-X	96,000	4	43	54	44	55	45	55	46	56	48	56
G(*)RA120C-X	120,000	5	43	54	44	55	45	55	46	56	48	56
G(*)RA144C-X	144,000	6	43	54	44	55	45	55	46	56	48	56
G(*)RK060C-X	60,000	3	45	55	46	55	49	56	49	56	50	57
G(*)RK072C-X	72,000	3	43	54	44	55	45	55	46	56	48	56
G(*)RK096C-X	96,000	4	43	54	44	55	45	55	46	56	48	56
G(*)RK120C-X	120,000	5	43	54	44	55	45	55	46	56	48	56

Table 10. Approximate Orifice Size for Natural and LP Gases

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 11. Gas Flow Rate

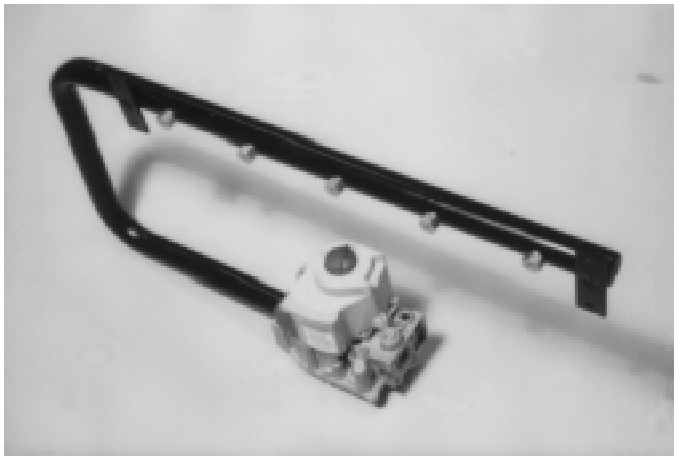


Figure 54. Gas Valve and Manifold

ACCESSORIES

Dual Fuel Kit (Figure 55)

This kit, P/N 914762 is used when a fossil fuel furnace is being used with a heat pump.

Natural Gas to Propane Conversion Kits

NORDYNE offers natural gas to propane conversion kits in standard P/N 902995 and high altitudes P/N 902996.

Electronic Air Cleaner (Figure 56)
NORDYNE offers an Electronic Air Cleaner for installation on all G6 series furnaces. These units are powered from the furnace's integrated control board.

ACCESSORIES

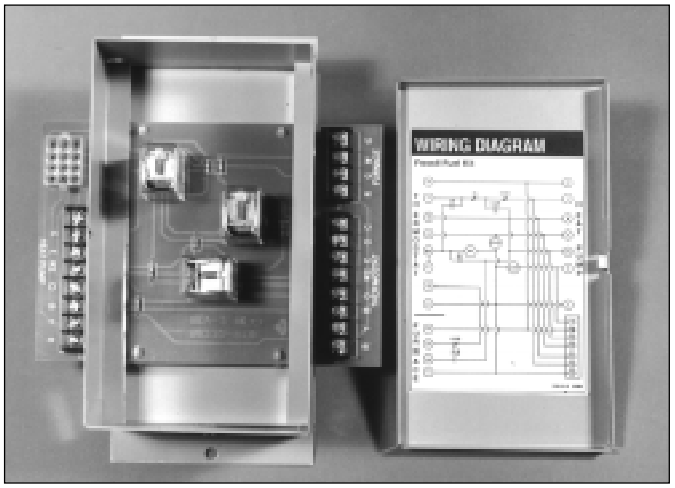


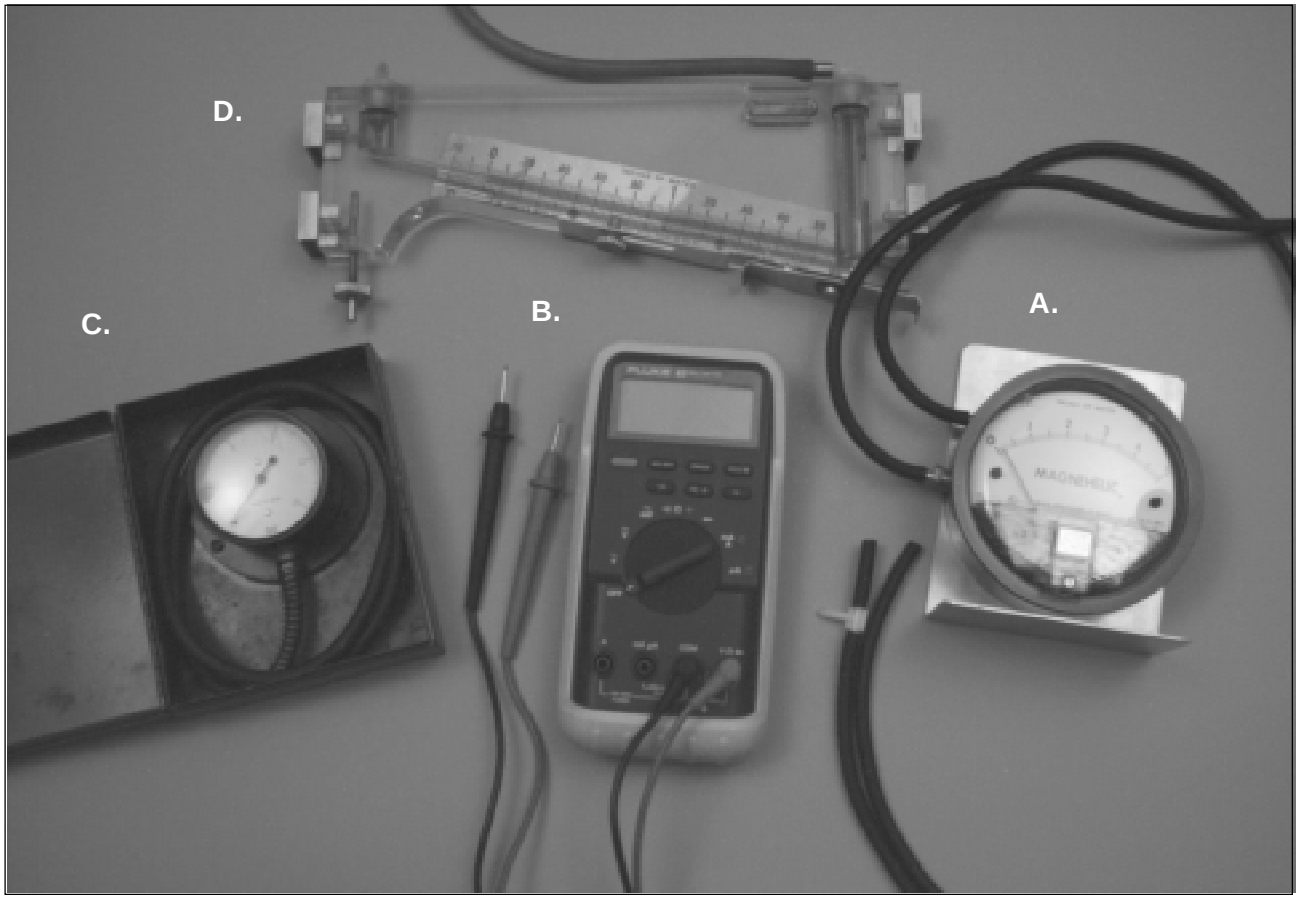
Figure 55. Dual Fuel Kit

Figure 56. Electronic Air Cleaner

VENT KIT #903196
BLEED TUBE CHART

WHITE	CLEAR	RED
G6RA 072C-16	G6RA144C-20	G6RA 060C-12
G6RA 096C-20	G6RA 144N-20	G6RA 072C-12
G6RA 072N-16	G6RA 144C-20-H	G6RA 096C-16
G6RA 096N-20	G6RA 144E-20	G6RA 120C-16
G6RA 072C-16-H		G6RA 120C-20
G6RA 096C-20-H		G6RA 060N-12
		G6RA 072N-12
		G6RA 096N-16
		G6RA 120N-16
		G6RA 120N-20
		G6RA 060C-12-H
		G6RA 072C-12-H
		G6RA 096C-16-H
		G6RA 120C-16-H
		G6RA 120C-20-H
		G6RK 060C-12
		G6RK 072C-12
		G6RK 072C-16
		G6RK 096C-12
		G6RK 096C-16
		G6RK 120C-20
		G6RK 060C-12-H
		G6RK 072C-12-H
		G6RK 072C-16-H
		G6RK 096C-12-H
		G6RK 096C-16-H
		G6RK 120C-20-H
		G6RA 072E-12
		G6RA 096E-16
		G6RA 120E-20

NOTE: For G6RA 045C-08 NO Bleed Tube Used.



Typical meters used to service furnaces.

A. Differential Pressure Gauge
B. Volt-Ohm Meter
C. Gas Pressure Gauge
D. Incline Manometer

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