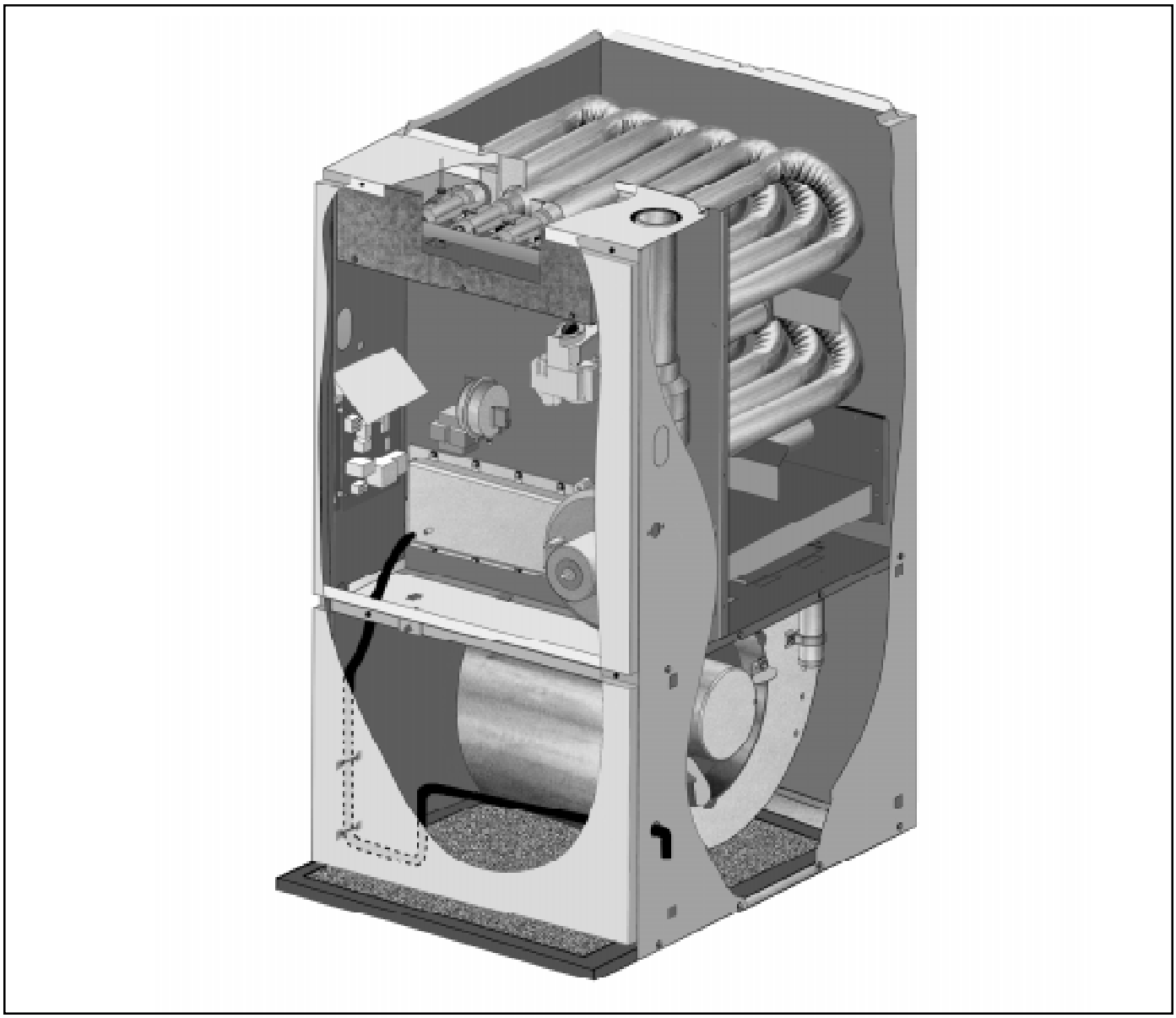
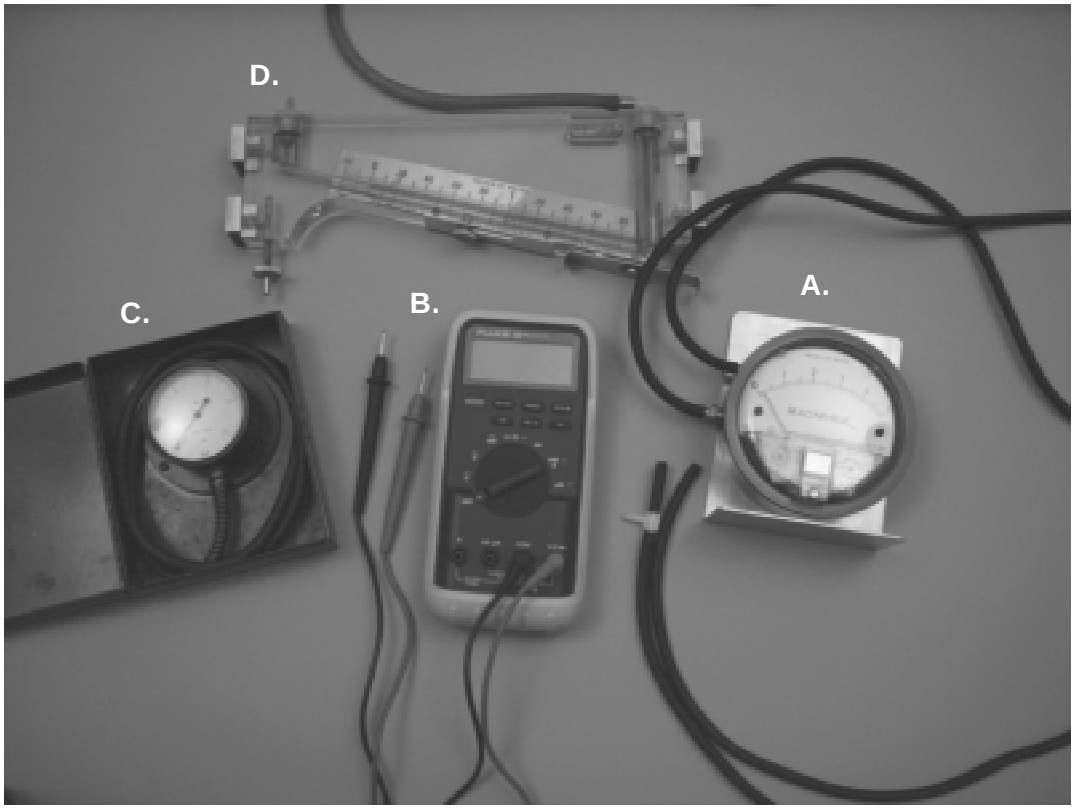
G6 Series

90+ High Efficiency Upflow/Downflow Models



Service Manual



Typical meters used to service furnaces.

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

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INTRODUCTION

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

This condensing furnace represents the very latest in high 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 models and downflow models installed as direct vent model non-direct Vent 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 3.*)

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.

⚠ WARNING

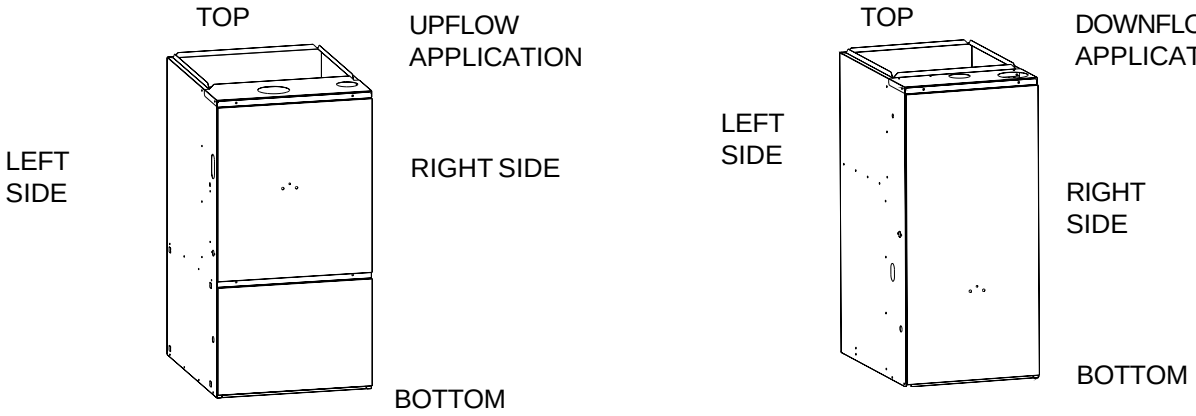
Do not install this furnace in a mobile home. Installation in a mobile home could cause fire, property damage, and/or personal injury.

GENERAL

The extra high efficiency upflow and downflow gas furnaces may be installed free standing in a utility room, basement, or enclosed in an alcove or closet. The extended flush jacket provides a pleasing "appliance appearance" installation. Design certified by the American Gas Association (AGA) Laboratories and the Canadian Gas Association (CGA) Laboratories. The product is truly designed with the contractor and consumer in mind.

The G6R (C,D,L) Series covers all upflow and downflow applications. The furnace uses hot surface ignition providing AFUEs in the 90+ range from 40,000 to 120,000 Btuhs.

The heat exchanger is a tubular design made from aluminized steel. The direct drive multi-speed blowers range from 1/3 to 3/4 hp to handle any air conditioning application up to 5 Tons.



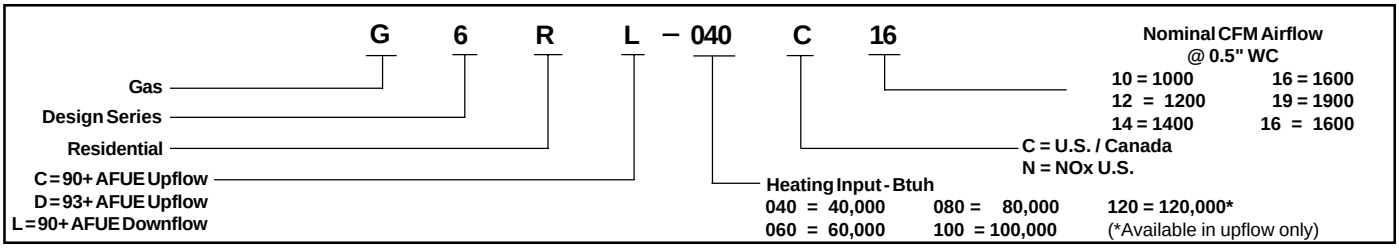
UPFLOW MINIMUM CLEARANCES TO COMBUSTIBLE MATERIAL

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

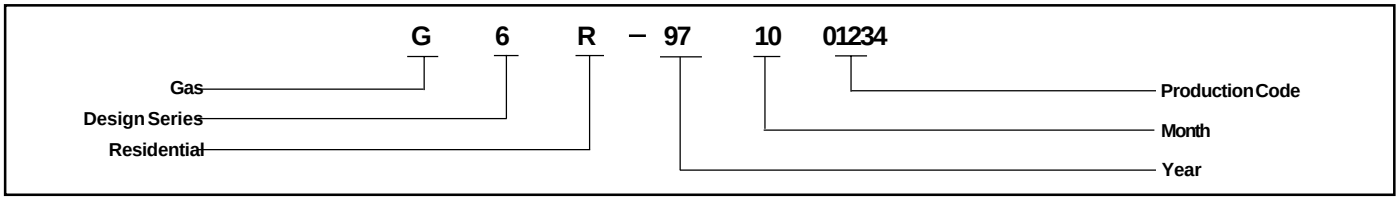
* Allow 36" minimum clearance for service.

Table 1. Minimum Clearances to Combustible Material.

MODEL IDENTIFICATION CODE



SERIAL NUMBER IDENTIFICATION CODE



FURNACE SPECIFICATIONS

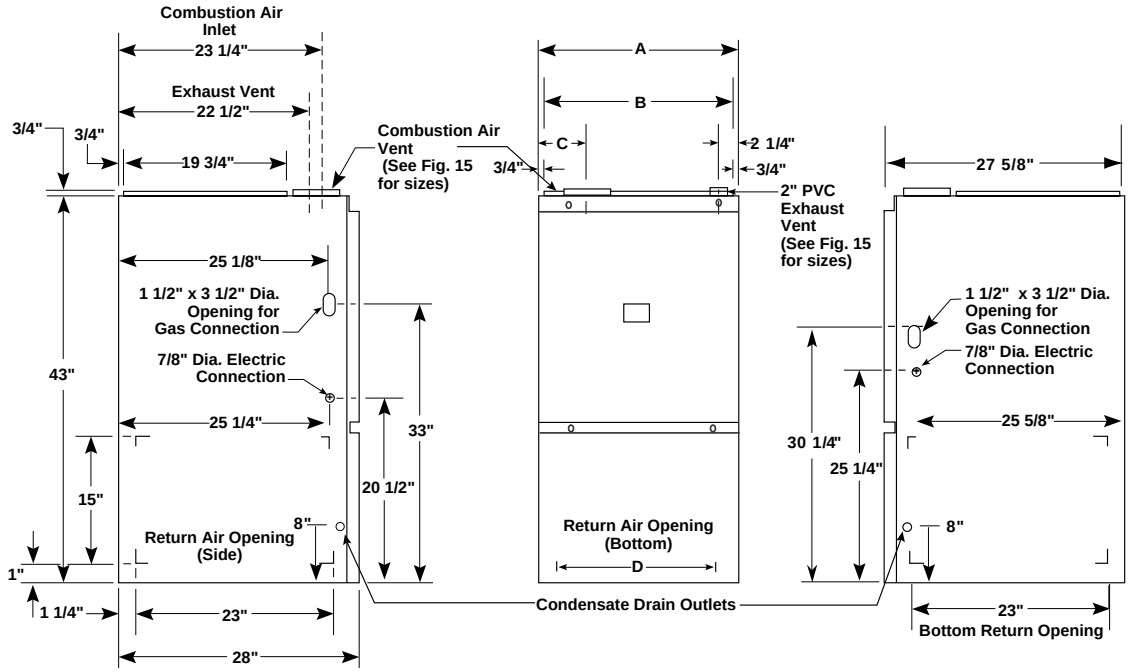
G6RC MODEL NUMBERS:	-040C-12	-060C-12	-080C-16	-100C-16	-120C-16	-120C-20
Input-Btuh (a)	40,000	60,000	80,000	100,000	120,000	120,000
Heating Capacity - Btuh	36,000	54,000	72,000	90,000	108,000	108,000
AFUE	**90+**	**90+**	**90+**	**90+**	**90+**	**90+**
Blower D x W	10 x 6	10 x 6	10 x 10	10 x 10	10 x 10	11 x 10
Motor H.P. -Speed -Type	1/3 - 3 - PSC	1/3 - 3 - PSC	1/2 - 4 -PSC	1/2 - 4 -PSC	1/2 - 4 -PSC	3/4 - 4 -PSC
Motor FLA	6.0	6.0	7.9	7.9	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	40 - 70	45 - 75	55 - 85	55 - 85

G6RD MODEL NUMBERS:	-040C-12	-060C-10	-080C-14	-100C-14	-120C-14	-120C-19
Input-Btuh (a)	40,000	60,000	80,000	100,000	120,000	120,000
Heating Capacity - Btuh	37,400	56,100	74,800	93,500	112,200	112,200
AFUE	**93.5+**	**93.5+**	**93.5+**	**93.5+**	**93.5+**	**93.5+**
Blower D x W	10 x 6	10 x 6	10 x 10	10 x 10	10 x 10	11 x 10
Motor H.P. -Speed -Type	1/3 - 3 - PSC	1/3 - 3 - PSC	1/2 - 4 -PSC	1/2 - 4 -PSC	1/2 - 4 -PSC	3/4 - 4 -PSC
Motor FLA	6.0	6.0	7.9	7.9	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	45 - 75	45 - 75	45 - 75	45 - 75	50 - 80	55 - 85

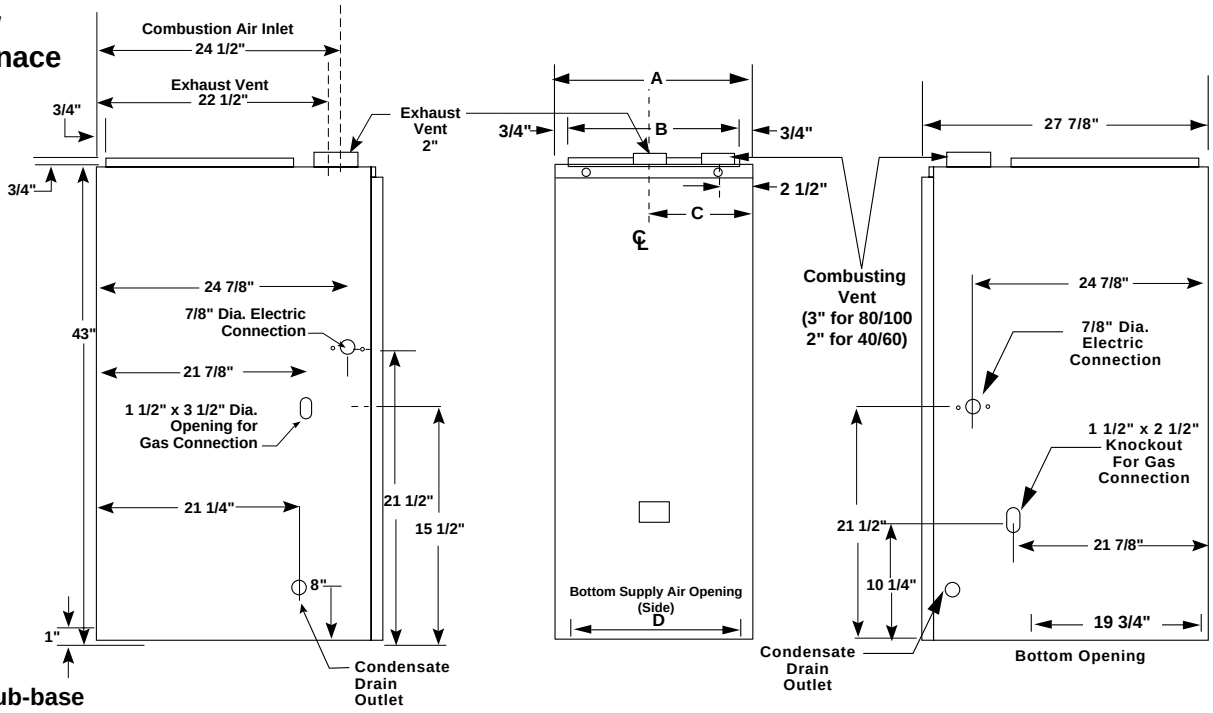
G6RL MODEL NUMBERS:	-040C-12	-060C-12	-080C-16	-100-16
Input-Btuh (a)	40,000	60,000	80,000	100,000
Heating Capacity - Btuh	36,000	54,000	72,000	90,000
AFUE	**90+**	**90+**	**90+**	**90+**
Blower D x W	10 x 6	10 x 6	10 x 10	10 x 10
Motor H.P. -Speed -Type	1/3 - 3 - PSC	1/3 - 3 - PSC	1/2 - 4 -PSC	1/2 - 4 -PSC
Motor FLA	7.0	7.0	9.0	9.0
Maximum Ext. SP - In. W.C.	0.5	0.5	0.5	0.5
Temperature Rise Range - °F	35 - 65	40 - 70	45 - 75	50 - 80

Table 2. Specifications

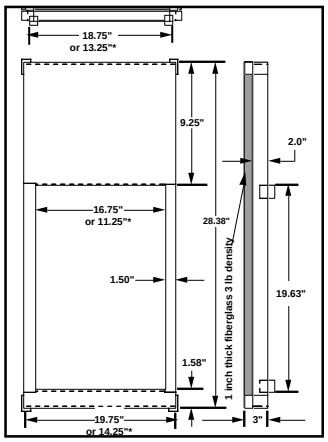
Upflow G6RC & G6RD Furnaces



Downflow G6RL Furnace



Downflow Sub-base



Model Number	Furnace Btuh	Dimensions (inches)				Shipping Weight (lbs)
		A	B	C	D	
G6R(C,D)040C	40,000	14 1/4	12 3/4	5 1/8	11 3/4	116
G6R(C,D)060C	60,000	14 1/4	12 3/4	5 1/8	11 3/4	122
G6R(C,D)080C	80,000	19 3/4	18 1/4	7 7/8	17 1/4	156
G6R(C,D)100C	100,000	19 3/4	18 1/4	7 7/8	17 1/4	170
G6R(C,D)120C	120,000	22 1/2	21	9 1/4	20	195
G6RL040C	40,000	14 1/4	12 3/4	4 5/8	12 3/4	115
G6RL060C	60,000	14 1/4	12 3/4	4 5/8	12 3/4	125
G6RL080C	80,000	19 3/4	18 1/4	10	18 1/4	155
G6RL100C	100,000	19 3/4	18 1/4	10	18 1/4	170

Figure 1. G6RC, G6RD, & G6RL Unit Dimensions

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.

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

⚠ WARNING

Products of combustion must not be allowed to enter the return air ductwork or the circulating air supply. Failure to prevent products of combustion from being circulated into the living space can 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.

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

Furnace Model No.	Furnace Input Btuh	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
G6RC040C-12	40,000	High *	1/3	1330	-	1280	-	1230	-	1170	-	1120	-
		Medium		1190	-	1160	-	1110	-	1060	-	1010	-
		Low **		830	42	810	43	780	45	760	46	720	49
G6RC060C-12	60,000	High *	1/3	1310	-	1260	-	1210	-	1160	-	1100	-
		Medium		1160	45	1120	47	1080	49	1050	50	990	53
		Low **		800	66	780	67	760	69	740	71	710	74
G6RC080C-16	80,000	High *	1/2	1840	-	1780	-	1700	-	1630	-	1550	-
		Med-High		1600	43	1560	44	1470	47	1400	49	1350	51
		Med-Low **		1380	50	1350	51	1300	53	1250	55	1190	58
		Low		1100	-	1050	-	1000	-	950	-	900	-
G6RC100C-16	100,000	High *	1/2	1910	-	1860	-	1780	-	1700	-	1620	-
		Med-High **		1640	53	1620	54	1540	57	1480	59	1420	62
		Med-Low		1440	61	1410	62	1370	64	1320	66	1270	70
		Low		1230	-	1210	-	1180	-	1140	-	1090	-
G6RC120C-16	120,000	High *	1/2	1860	56	1800	58	1730	61	1650	64	1570	67
		Med-High **		1650	64	1610	65	1550	68	1480	71	1410	74
		Med-Low		1440	73	1410	74	1380	76	1320	80	1280	82
		Low		1230	-	1210	-	1180	-	1140	-	1090	-
G6RC120C-20	120,000	High *	3/4	2260	46	2200	47	2140	49	2070	50	1990	52
		Med-High		1870	56	1840	56	1790	58	1760	59	1710	61
		Med-Low **		1540	67	1530	68	1510	69	1470	71	1430	73
		Low		1360	-	1330	-	1310	-	1280	-	1250	-
G6RD040-10	40,000	High *	1/3	1050	34	1005	35	960	37	915	38	855	41
		Medium		990	36	950	37	905	39	860	41	810	43
		Low **		770	46	740	48	700	50	660	53	625	56
G6RD060-10	60,000	High *	1/3	1175	45	1125	47	1075	49	1030	51	970	54
		Medium **		1075	49	1040	51	995	53	950	56	900	59
		Low		800	66	770	69	745	71	710	74	670	-
G6RD080-14	80,000	High *	1/2	1620	43	1560	45	1490	47	1430	49	1365	52
		Med High		1450	49	1400	50	1350	52	1295	54	1240	57
		Med Low **		1255	56	1225	57	1180	60	1145	61	1105	64
		Low		1080	65	1055	67	1030	68	1000	70	960	73
G6RD100-14	100,000	High *	1/2	1620	54	1555	57	1485	59	1425	62	1355	65
		Med High **		1430	62	1375	64	1330	66	1265	70	1210	73
		Med Low		1260	70	1220	72	1170	75	1130	-	1070	-
		Low		1085	-	1050	-	1015	-	970	-	935	-
G6RD120-14	120,000	High *	1/2	1700	62	1635	65	1565	67	1500	70	1435	74
		Med High **		1510	70	1455	73	1405	75	1350	78	1290	-
		Med Low		1330	79	1280	-	1240	-	1195	-	1145	-
		Low		1140	-	1110	-	1075	-	1040	-	1010	-
G6RD120-19	120,000	High *	3/4	2140	49	2070	51	2010	53	1945	54	1870	56
		Med High		1955	54	1900	56	1850	57	1800	59	1740	61
		Med Low **		1660	64	1620	65	1575	67	1540	69	1495	71
		Low		1450	73	1430	74	1400	75	1360	78	1340	79
G6RL040C-12	40,000	High *	1/3	1280	-	1210	-	1180	-	1140	-	1090	-
		Medium		1140	-	1090	-	1060	-	1030	-	980	-
		Low **		875	40	835	41	820	42	805	43	780	44
G6RL060C-12	60,000	High *	1/3	1260	41	1190	44	1155	45	1120	46	1075	51
		Medium		1120	46	1070	49	1040	50	1010	51	960	54
		Low**		855	61	815	64	800	65	780	67	760	68
G6RL080C-16	80,000	High *	1/2	1635	42	1585	44	1525	45	1460	47	1400	49
		Med-High		1435	48	1395	50	1350	51	1300	53	1255	55
		Med-Low **		1230	56	1200	58	1165	59	1130	61	1090	64
		Low		1050	-	1035	-	1010	-	980	-	950	-
G6RL100C-16	100,000	High *	1/2	1600	54	1555	56	1500	58	1445	60	1380	63
		Med-High **		1475	59	1435	60	1385	63	1335	65	1290	67
		Med-Low		1320	-	1290	-	1250	-	1215	-	1170	-
		Low		1150	-	1130	-	1110	-	1075	-	1040	-

* 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 3. Furnace Airflow Data

VENTING AND COMBUSTION AIR REQUIREMENTS

General

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

An important consideration in selecting one or two pipe installation is the quality of the combustion air. Indoor air is sometimes contaminated with various household chemicals which can cause severe corrosion in the furnace combustion system. Some common sources of these chemicals are detergents, bleaches, aerosol sprays, and cleaning solvents. Unless indoor air is known to be free of these materials, two pipe installation is recommended.

Air Requirements For One-Pipe Installation

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

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

When air for combustion is to be taken from around the furnace, a protective screen must be installed over the combustion air intake opening. This screen is provided with the furnace installation instructions and functions to prevent debris from entering the combustion system. It should be installed on the combustion air intake collar or inlet PVC. If furnace location is such that this opening might be unintentionally obstructed, a 3" PVC elbow should be installed on the collar, and the screen placed inside the inlet of the elbow. See Figure 2.

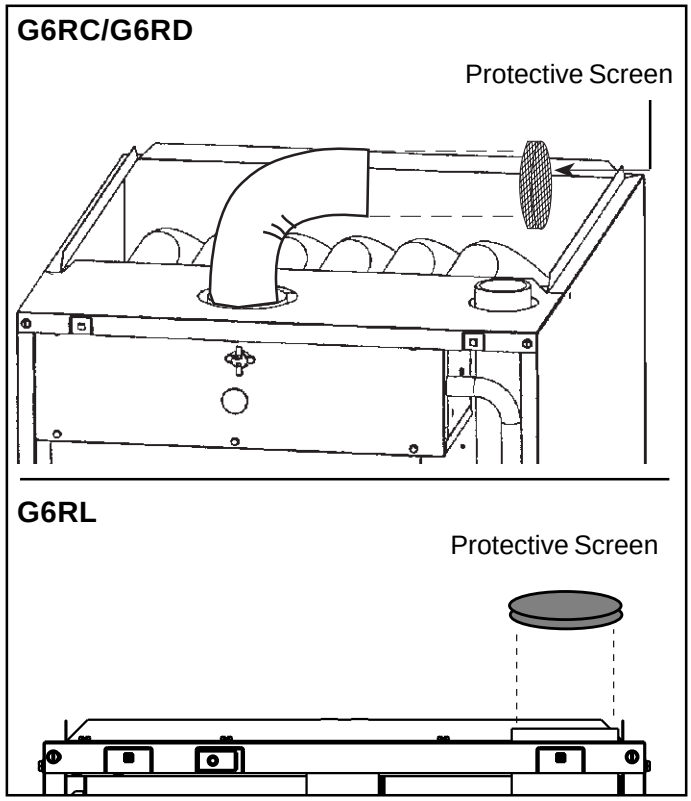


Figure 2. Protective Screen for One Pipe Installation

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 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.

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

⚠ 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.

⚠ WARNING:

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

Installation In A Confined Space

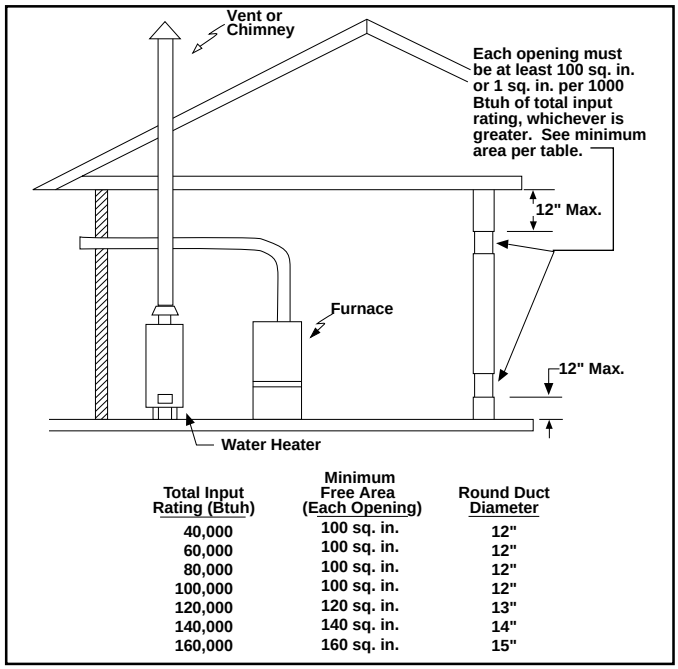
A confined space is one which does not meet the unconfined space volume requirements, and typically involves installation in a small room. All such installations must have specific provisions for introduction of combustion and ventilation air. *Codes require that two openings be provided for this - one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

Combustion air openings must not be restricted in any manner.

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

Air From Inside

Air for combustion and ventilation may be taken from inside the building through an interior wall *if the building is not "tight" and if the total volume of the furnace space and the space from which air is drawn meets the volume requirements for an unconfined space.* In such cases, the two openings in the wall must each have free area of at least one square inch per 1000 Btuh of *total* appliance input, but not less than 100 square inches of free area. See Figure 3. 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.

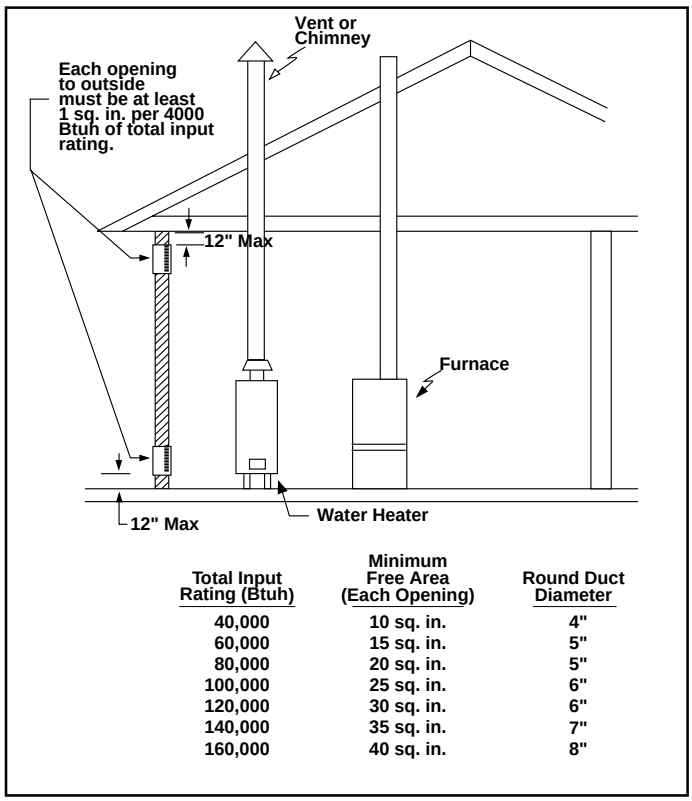


Total Input Rating (Btuh)	Minimum Free Area (Each Opening)	Round Duct Diameter
40,000	100 sq. in.	12"
60,000	100 sq. in.	12"
80,000	100 sq. in.	12"
100,000	100 sq. in.	12"
120,000	120 sq. in.	13"
140,000	140 sq. in.	14"
160,000	160 sq. in.	15"

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

Air Directly Through An Exterior Wall

If combustion air is provided directly through an exterior wall, the two openings must *each* have free area of at least one square inch per 4000 Btuh of *total* appliance input. (See Figure 4.)



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"

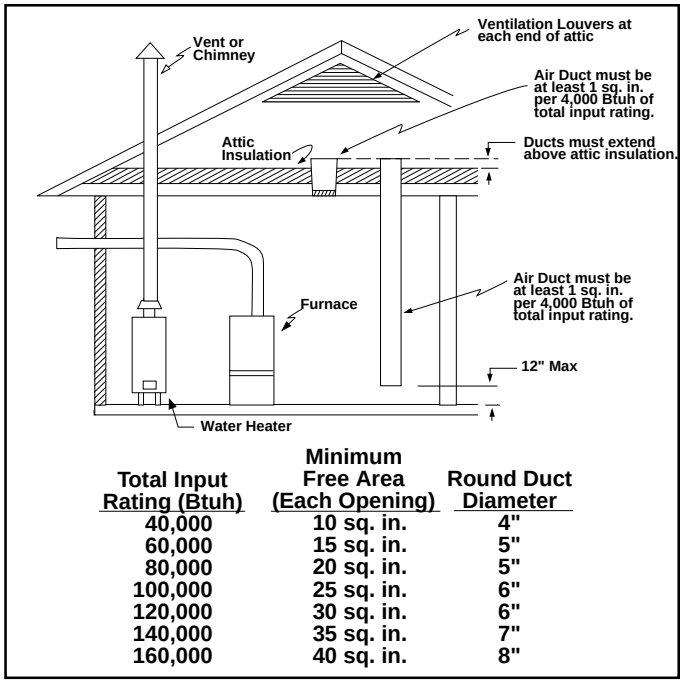
Figure 4. Equipment in a Confined Space with all Combustion Air Drawn from the Outside through Exterior Wall

Outdoor Air Through Vertical Openings or Ducts

If combustion air is provided through vertical ducts or openings to attics or crawl spaces, the two openings must each have free area of at least one square inch per 4000 Btuh of total appliance input. Ducts must have cross-sectional areas at least as large as the free area of their respective openings to the furnace space. Attics or crawl spaces must communicate freely with the outdoors if they are the source of air for combustion and ventilation. (See Figures 10 and 11.)

⚠ 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.



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 Air Drawn from Outdoors through Vertical Ducts - from Ventilated Attic

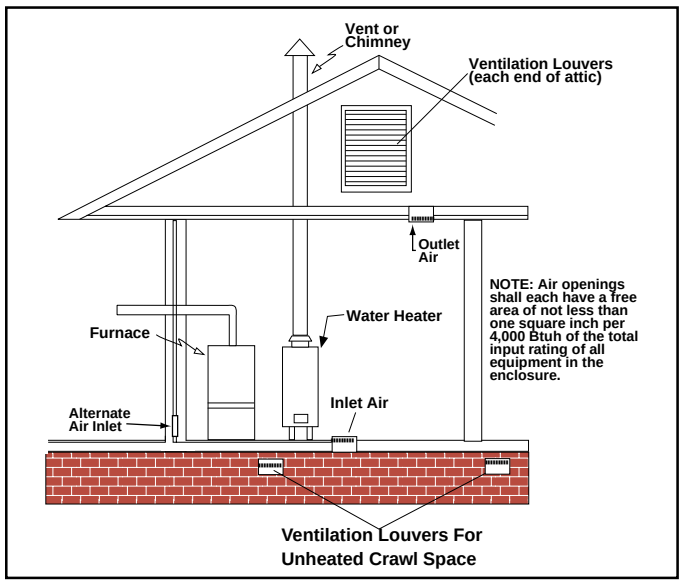
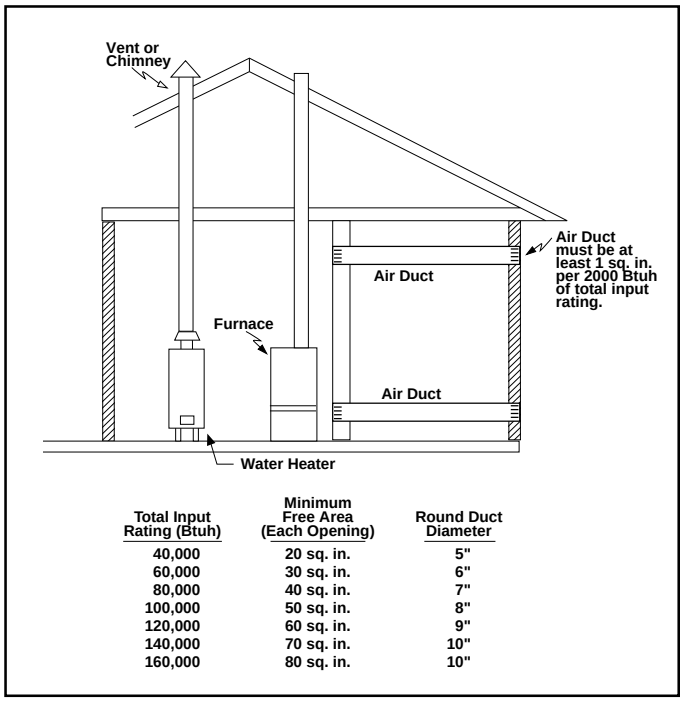


Figure 6. Equipment in a Confined Space with all Air Drawn from Outdoors - Through Ventilated Crawl Space and Ventilated Attic

Outdoor Air Through Horizontal Openings or Ducts

If combustion air is taken from outdoors through horizontal ducts, the openings must *each* have free area of at least one square inch per 2000 Btuh of total appliance input. Ducts must have cross-sectional area at least as large as the free area of their respective openings to the furnace space. (See Figure 7.)



Total Input Rating (Btuh)	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 Air Drawn from the Outside through Horizontal Ducts

VENTING REQUIREMENTS

General

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

NORDYNE condensing furnaces are classified as "Category IV" appliances, which require special venting materials and installation procedures. Category IV appliances operate with positive vent pressure and therefore require vent systems which are thoroughly sealed. They also produce combustion condensate, which is acidic and can cause severe corrosion of ordinary venting materials. Furnace operation can be adversely affected by restrictive vent and combustion air piping. Therefore, *vent and combustion air piping lengths must conform completely to the requirements of Table 4.*

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

⚠ WARNING:

FURNACE MUST NOT BE COMMON VENTED WITH OTHER APPLIANCES

Vent Pipe Material

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

Material	Standard
Schedule 40 PVC	D1785
PVC-DWV	D2665
SDR-21* & SDR-26*	D2241
ABS-DWV	D2661
Schedule 40 ABS	F628

*Note that Type SDR piping is not recognized in Canada.

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

Vent Pipe Length and Diameter

In order for the furnace to operate properly, the combustion air and vent piping must not be excessively restrictive. To ensure this use Table 4, which indicates the maximum allowable piping length for a furnace of specified input rate, when installed with piping of a selected diameter and number of elbows. **This table applies to the length and number of elbows for each pipe. For one-pipe installations the lengths in the table may be doubled.** To use the table, the furnace input rate, the centerline length and the number of elbows on each pipe must be known. Choose the diameter for which the tabulated length is equal or greater than required.

APPLICATION	SINGLE PIPE LENGTH (ft.) with 1 long radius elbows*.		DIRECT VENT, DUAL PIPE LENGTH (ft.) with 1 long radius elbows on each pipe.*					
PVC,CPVC or ABS	Outlet	Outlet	Inlet/Outlet		Inlet/Outlet		Inlet/Outlet	
SCH. 40 Pipe Size	2"	3"	2"	2"	3"	2"	3"	3"
Models G6RC,D,L 040	80	150	40	40	50	50	90	90
Models G6RC,D,L 060 & 080	60	150	30	30	35	35	90	90
Models G6RC,D,L 100 & 120	30	150	15	15	25	25	90	90

Table 4. Vent Table

*NOTES

1. Subtract 2.5 ft. for each additional 2" elbow and 3.5 ft. for each additional 3" elbow.
2. Two 45 degree elbows are equivalent to one 90 degree elbow.
3. One short radius elbow is equivalent to two long radius elbows
4. Do not include termination elbows in calculation of vent length
5. This table is applicable for elevations from sea level to 2000 ft. For higher elevations decrease vent pipe lengths by 8% per 1000 ft. of altitude.
6. Only the above pipe materials are approved for use with G6 Condensing Furnaces.

Use of the table is illustrated in the following example:

Example:

An 80,000 Btuh furnace is to be installed in a "one-pipe" system with 40 feet of vent piping. There are four elbows, including those exterior to the building.

Solution:

Consulting Table 4, in the single pipe length column for an 80,000 Btuh furnace, the maximum allowable length of 2" is 60 feet with one elbow. Select 2-1/2 or 3" pipe. For three additional elbows, deduct 2.5 ft. for each elbow, or 7.5 ft. for a maximum installed vent length of 52.5 ft.

Condensing furnace combustion products have very little buoyancy, so Table 4 is to be used without consideration of any vertical rise in the piping.

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

Vent Pipe Installation

Pipe Routing and Support

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

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

Piping must be mechanically supported so that its weight does not bear on the furnace. Supports must be at intervals no greater than five feet, and at smaller intervals if necessary to endure that there are no sagging sections to trap water. (See Figures 8 and 9.)

⚠ CAUTION:

Combustion air must not be drawn from a corrosive atmosphere.

Figure 15 illustrates vent and combustion air pipe sizes exiting the furnace. Transition to the correct size pipe must be done close to the furnace so that the full length of pipe is of the proper size.

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

GAS SUPPLY AND PIPING

General

This furnace is equipped for either left or right side gas entry. Typical gas service hook-ups are shown in Figure 21. When making the gas connection provide clearance between the gas supply line and the entry hole in the furnace casing to avoid unwanted noise and/or damage to the furnace.

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

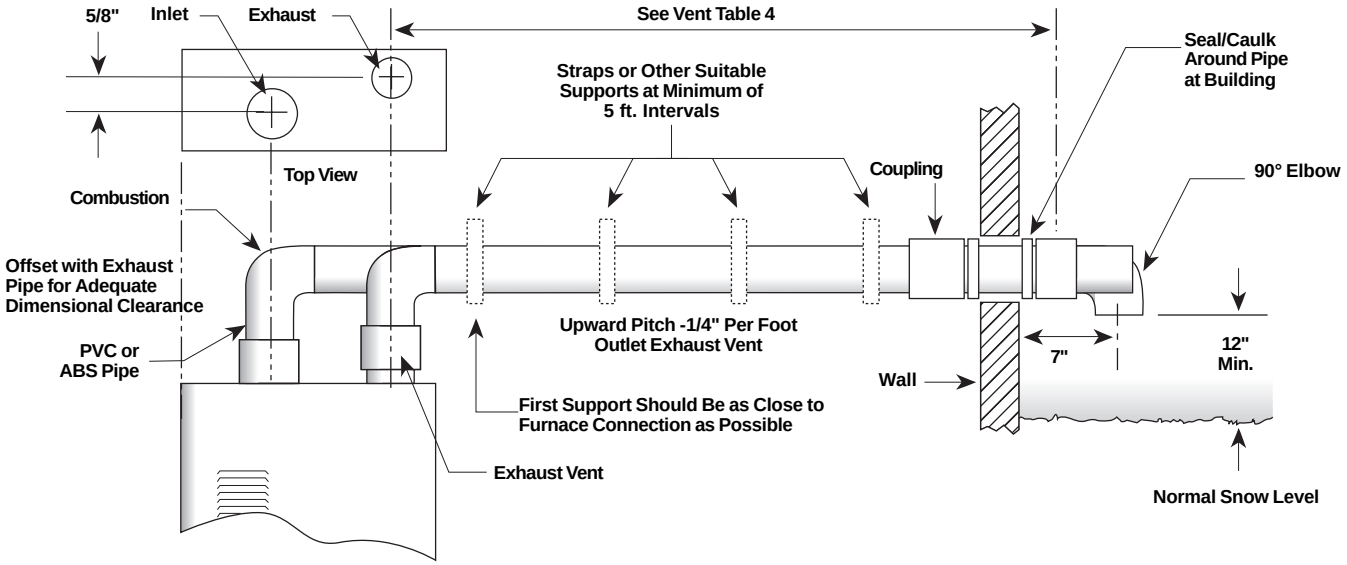
A drip leg should be installed in the vertical pipe run to the unit. Table 5 lists gas flow capacities for standard pipe sizes as a function of length in typical applications based on nominal pressure drop in the line.

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

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

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

G6RC & G6RD Upflow Furnaces



G6RL Downflow Furnaces

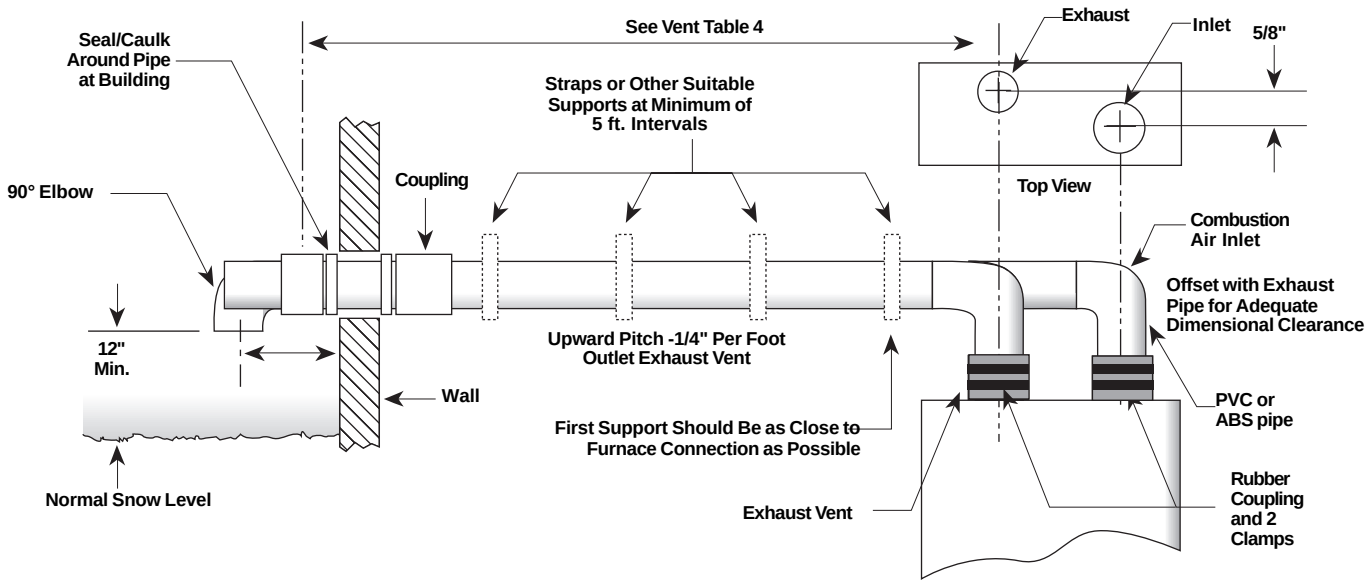


Figure 8. Horizontal

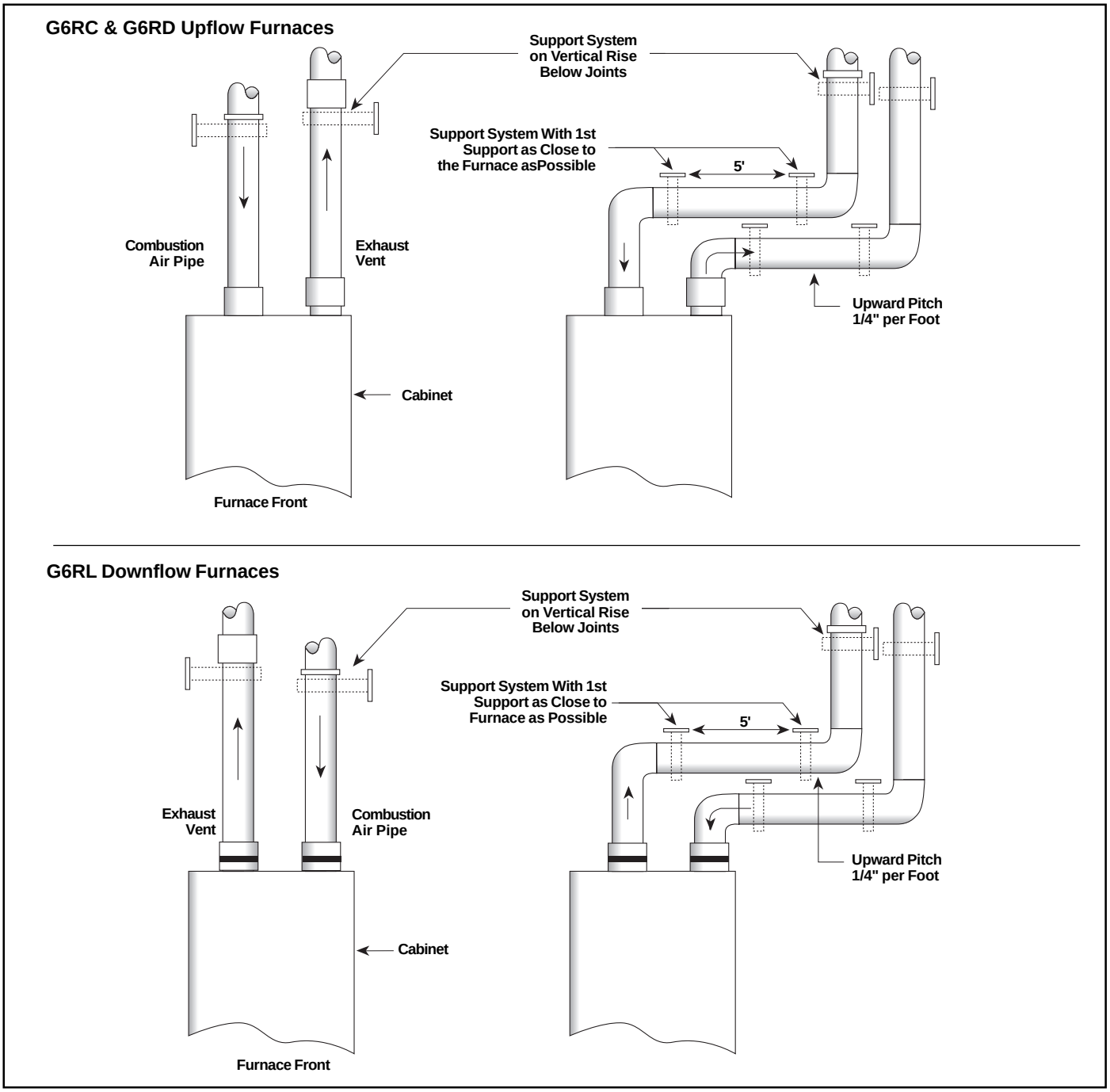


Figure 9. Vertical Venting

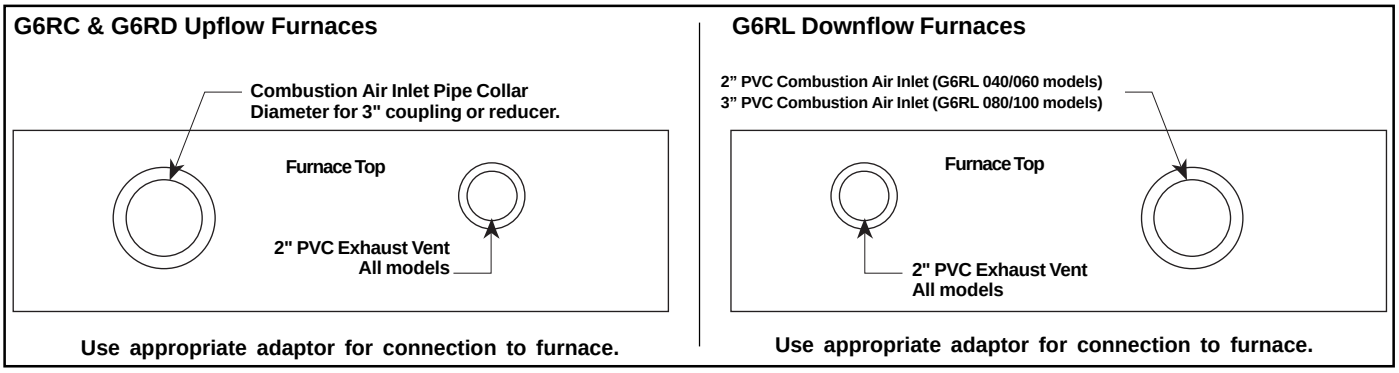


Figure 10. Furnace Pipe Adaptions

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.

⚠ 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.

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 (Figures 17 & 18) and the low voltage field wiring diagram (Figure 23).

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 rollout 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.
10. The inducer is de-energized after a 30 second postpurge.
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 24.)
12. Abnormal conditions: If a limit opens during operation, the inducer and circulating air blower continue to operate. The gas valve is de-energized immediately. The blowers continue to operate until the limit closes. When the limit closes the inducer blower is de-energized immediately. The circulating air blower continues to operate for the specified delay (factory set at 120 seconds).

Cooling Mode:

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

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 shut off.

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 emery cloth.)

If the furnace locks out after 5 attempts for ignition, it will try again every hour if a call for heat remains. If the inducer and circulating air blowers are operating, and items 1 through 8 have been checked, press the red reset button on the vent safety switch. (See Figure 27.) 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 14.) 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 1/4 inch quick-connect terminals marked "TWIN" on the furnace controls must be connected together for twinning. (See Figure 13.)

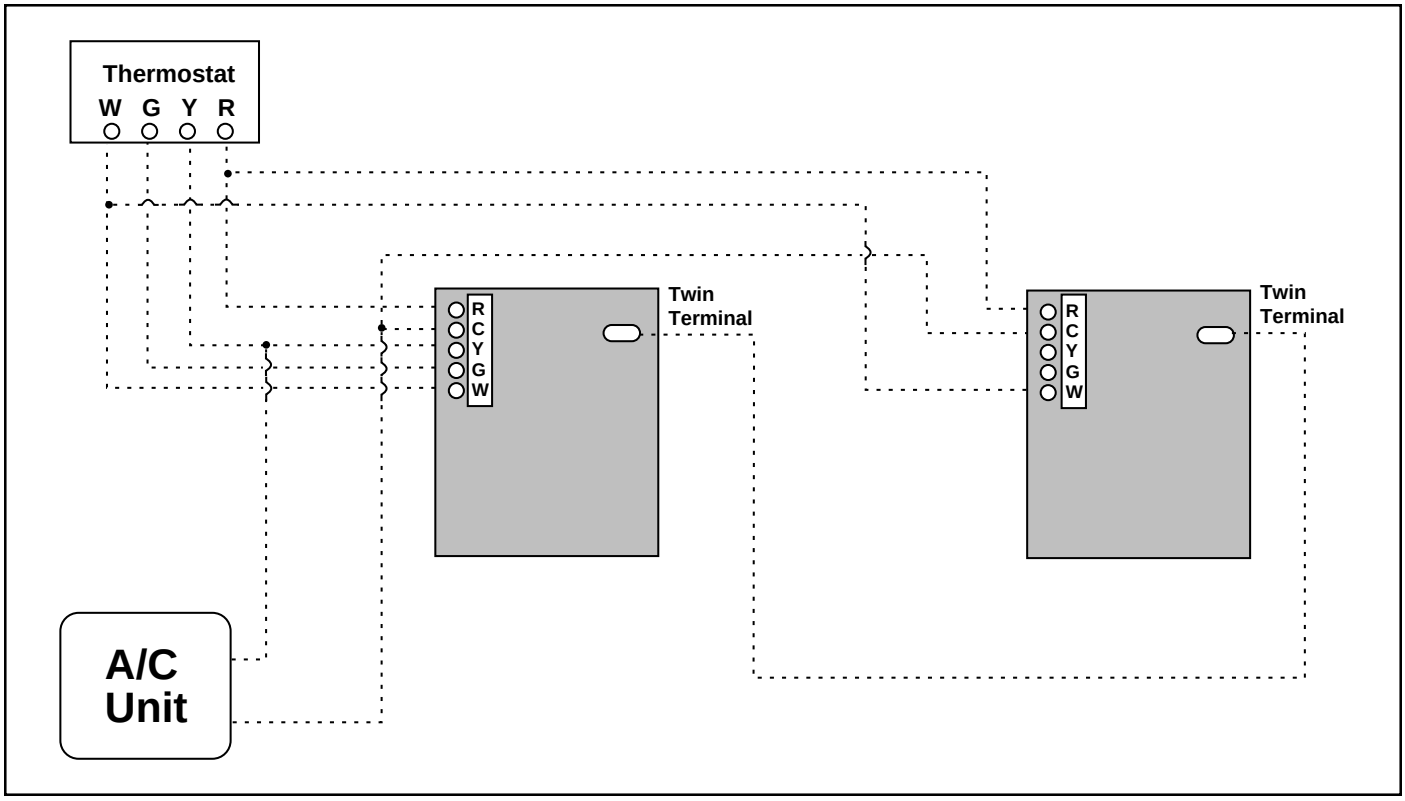


Figure 13. Twinning

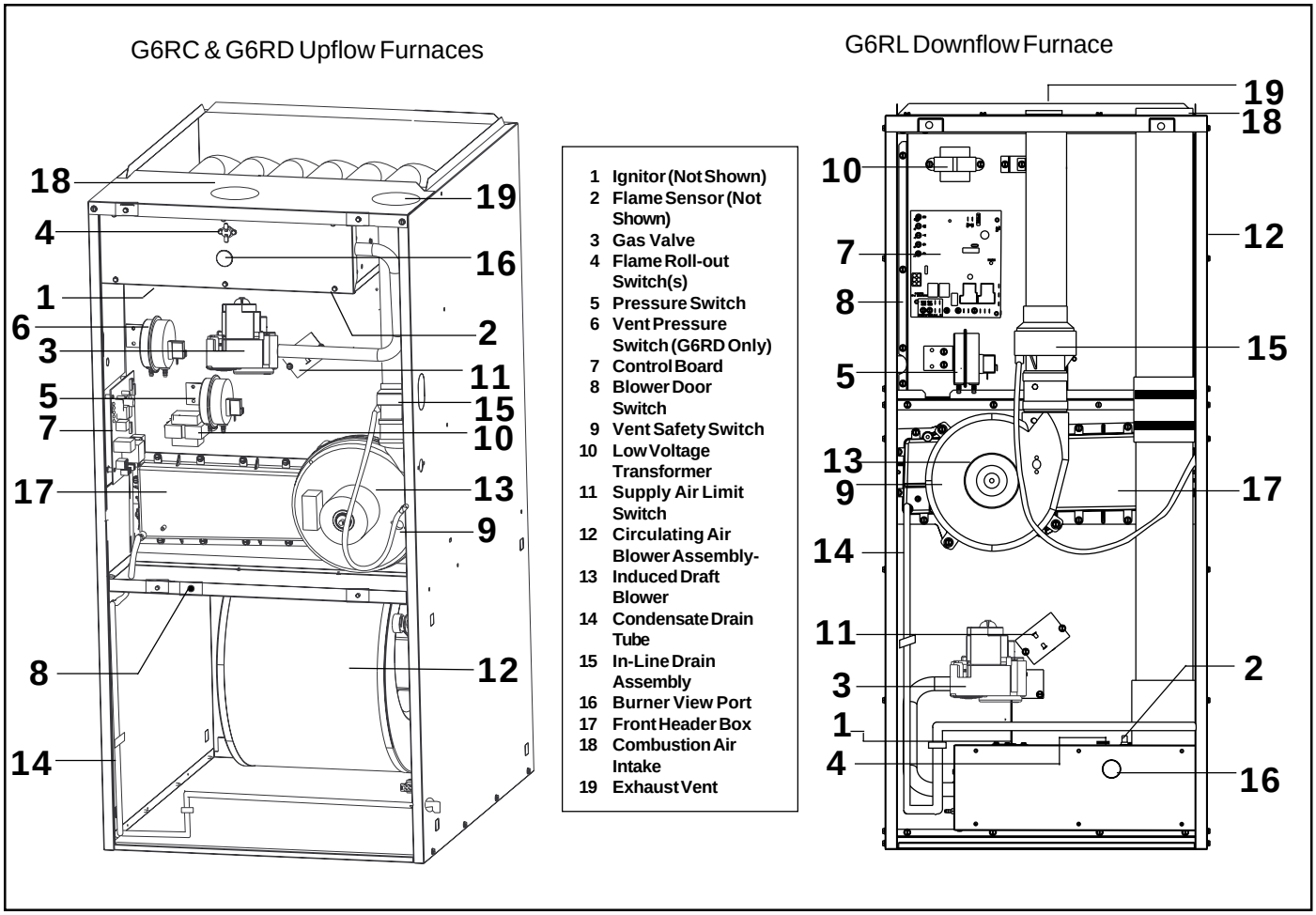


Figure 14. Component Parts

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

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 junction box located within the furnace.

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 19.)

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 Input (Btuh)	Cabinet Width (in.)	Nominal Electrical Supply	Maximum Operating Voltage	Minimum Operating Voltage	Maximum Furnace Amperes	Minimum Wire Gauge	Maximum Fuse or Circuit Breaker Amps**
40,000	14.25	115-60-1	127	103	8.9	14	15
60,000	14.25	115-60-1	127	103	8.9	14	15
80,000	19.75	115-60-1	127	103	11.3	14	15
100,000	19.75	115-60-1	127	103	11.3	14	15
120,000	22.50	115-60-1	127	103	15.3	12	20**

***Time Delay Fuses or HACR-type circuit breakers are required. **If 12 gauge wire is used a 20 Amp breaker is required.**

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

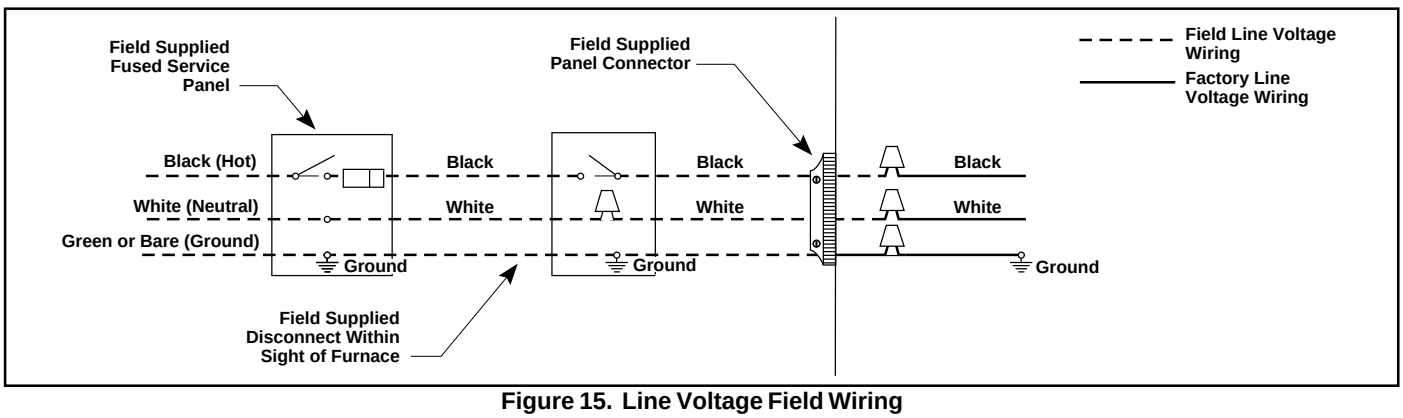
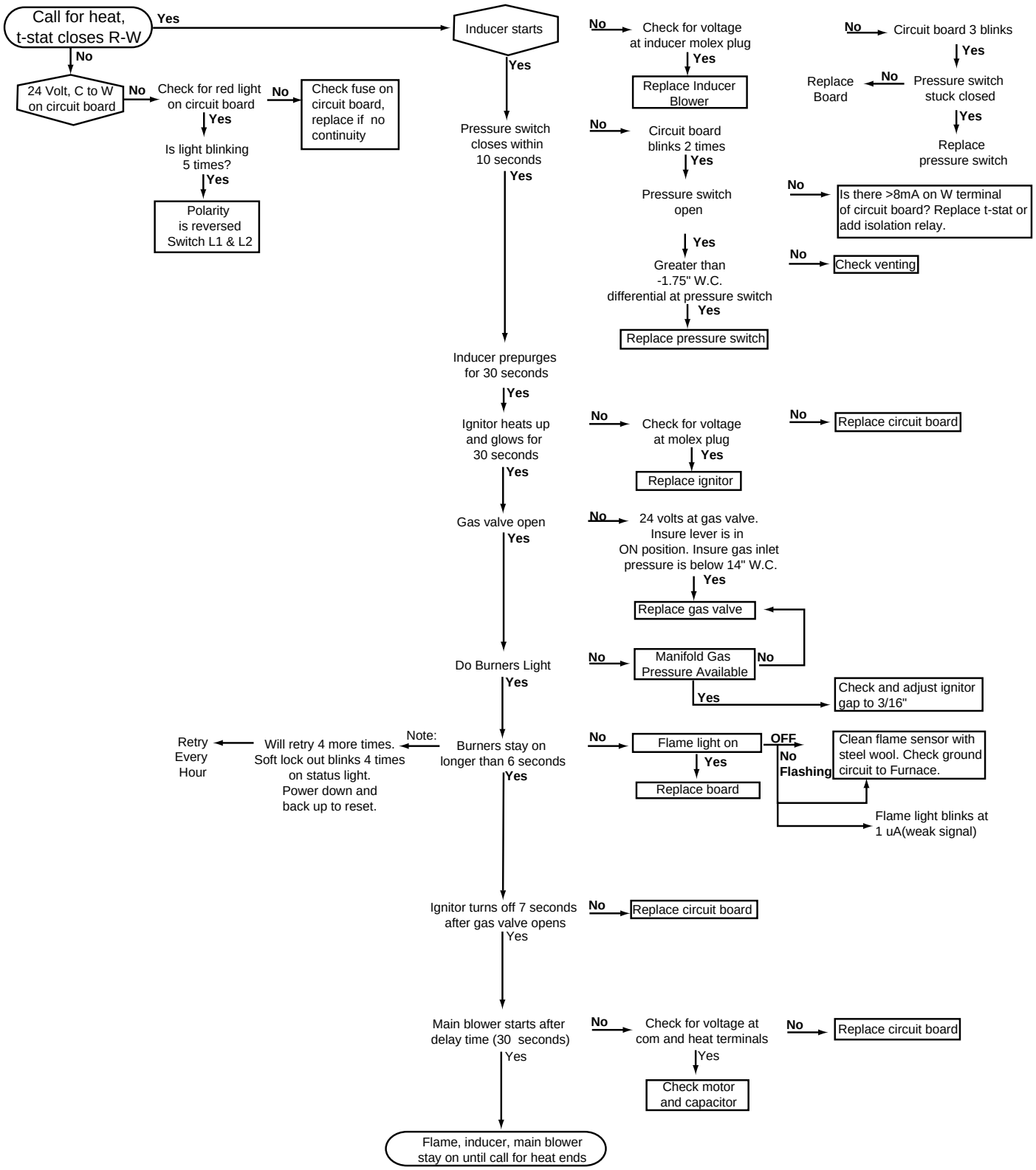


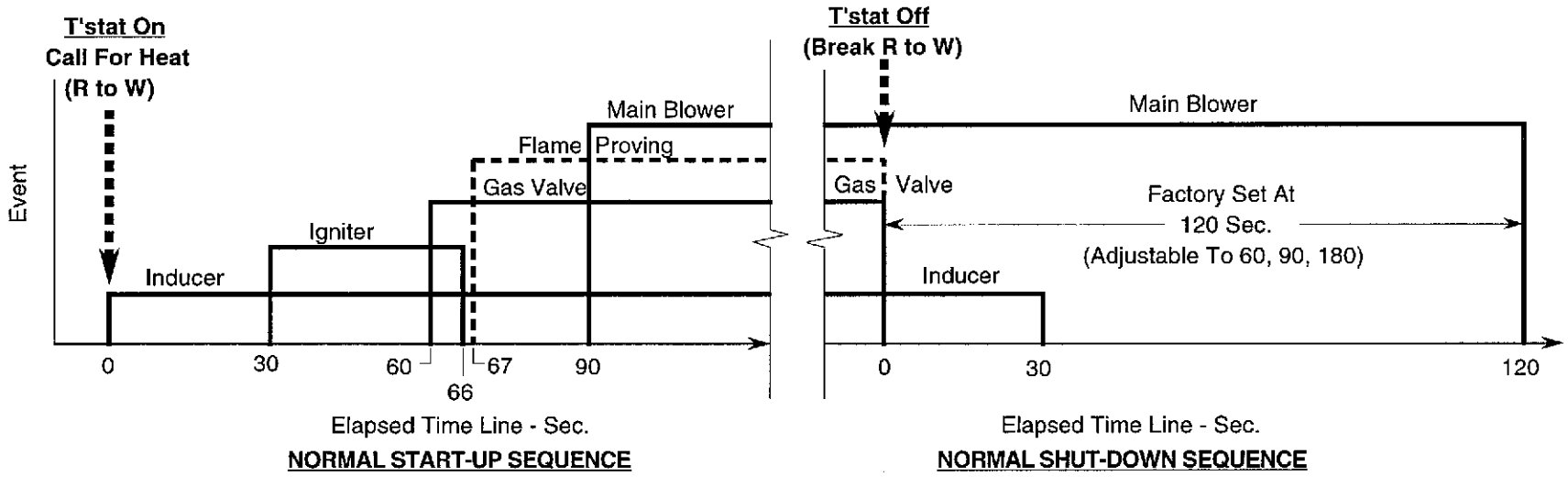
Figure 15. Line Voltage Field Wiring

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:

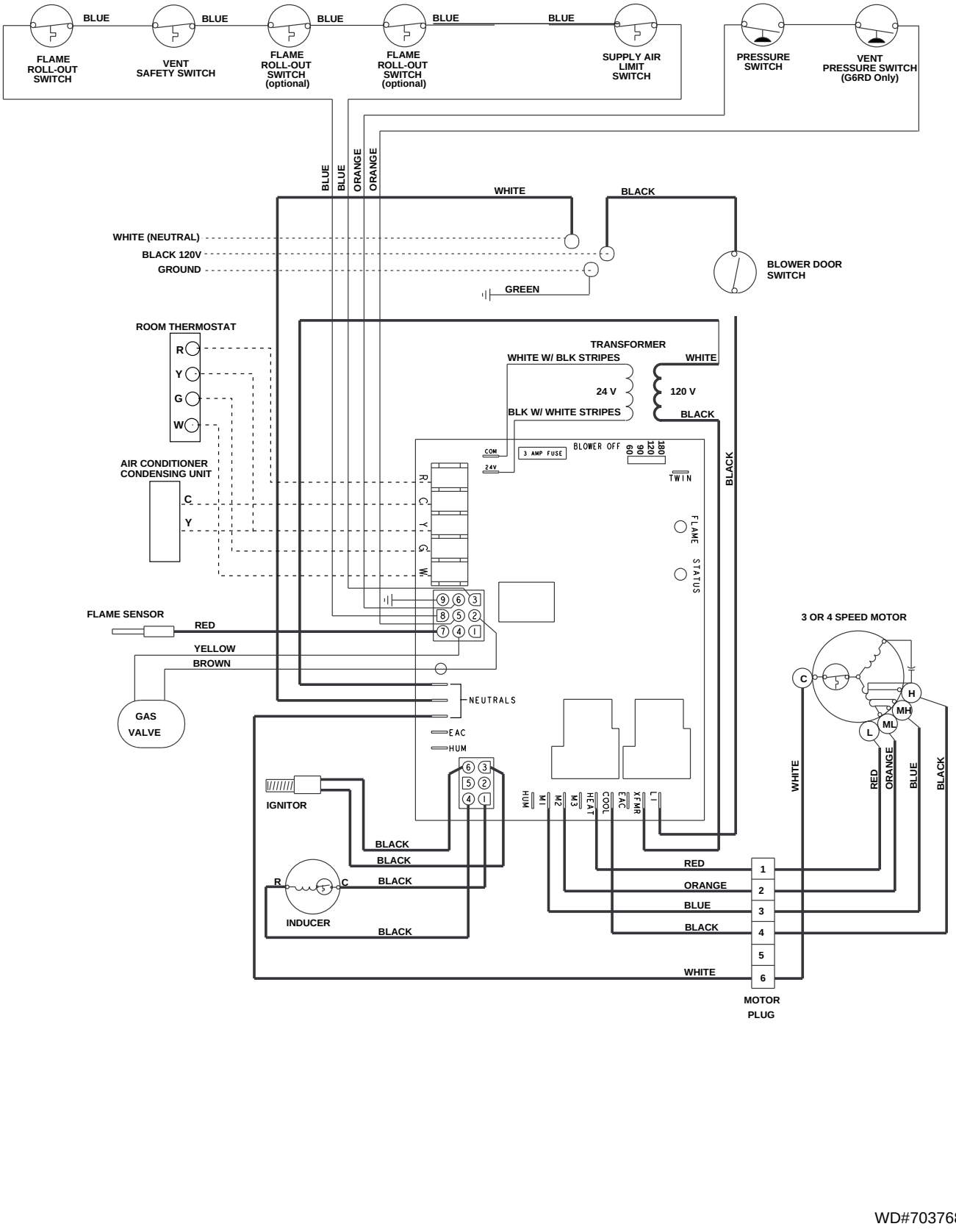
1. Close R to W circuit. The inducer motor is energized.
2. After a 30-second pre-purge the igniter is energized.
3. After a 30-second heat-up period the gas valve is energized (the igniter remains on during the first 6-seconds. The gas valve will be de-energized at 7-seconds if flame is not proved).
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 16. UTEC Control Sequence

For G6RC, G6RD Residential Furnaces



WD#703768

Figure 17. G6RC & G6RD Integrated Control Board System Diagram

For G6RL Residential Furnaces

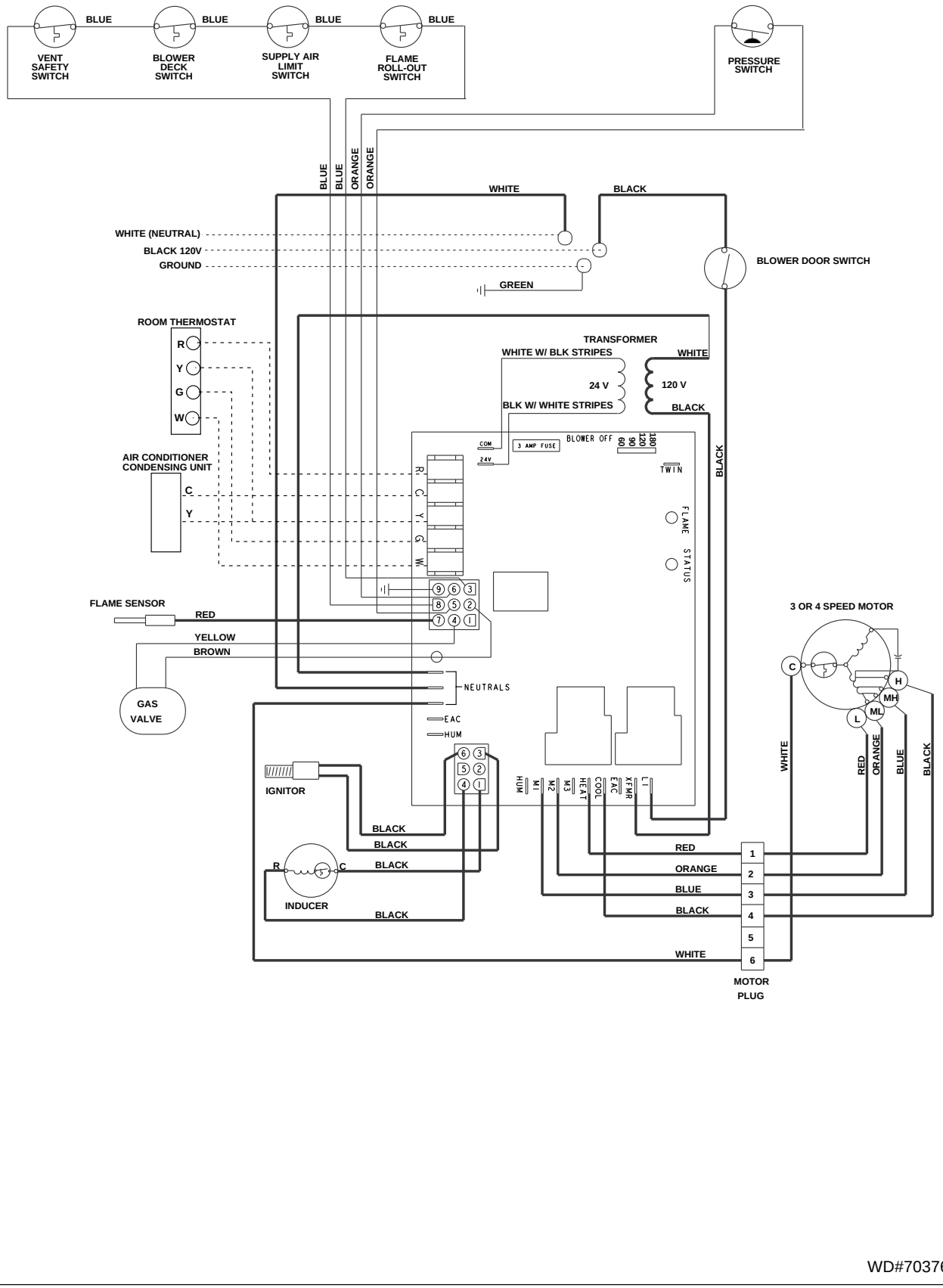


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Figure 18. G6RL Furnace Wiring Diagram

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.)

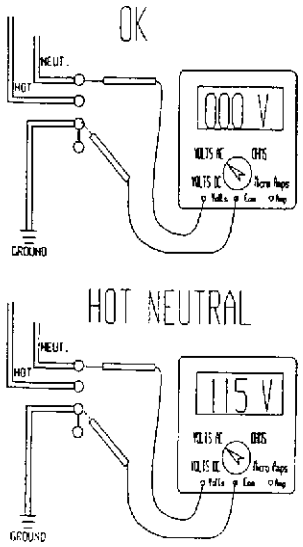


Figure 19. Polarity and Ground

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 20.) 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 21)

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.

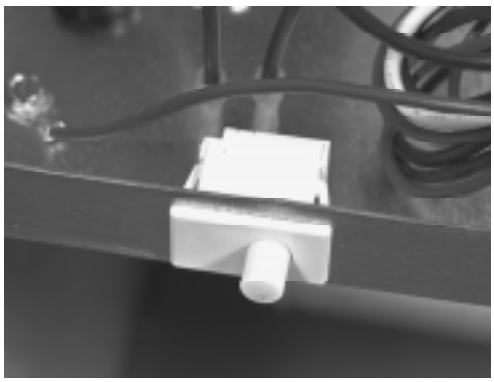


Figure 20.

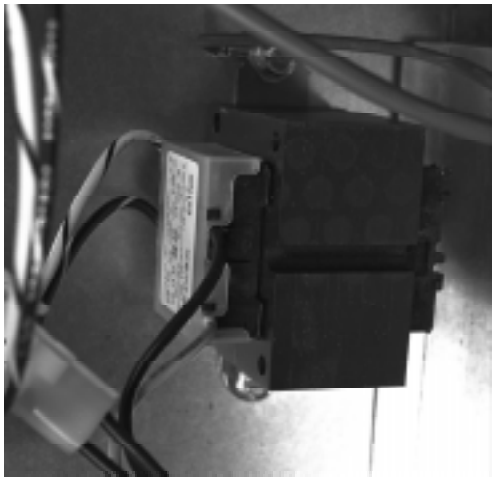


Figure 21.

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).

Figure 22.

Low Voltage Wiring

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 18.

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 Helex and measure current draw after blower starts. Divide by 10. Example: 4 Amps = .4 set at .4.

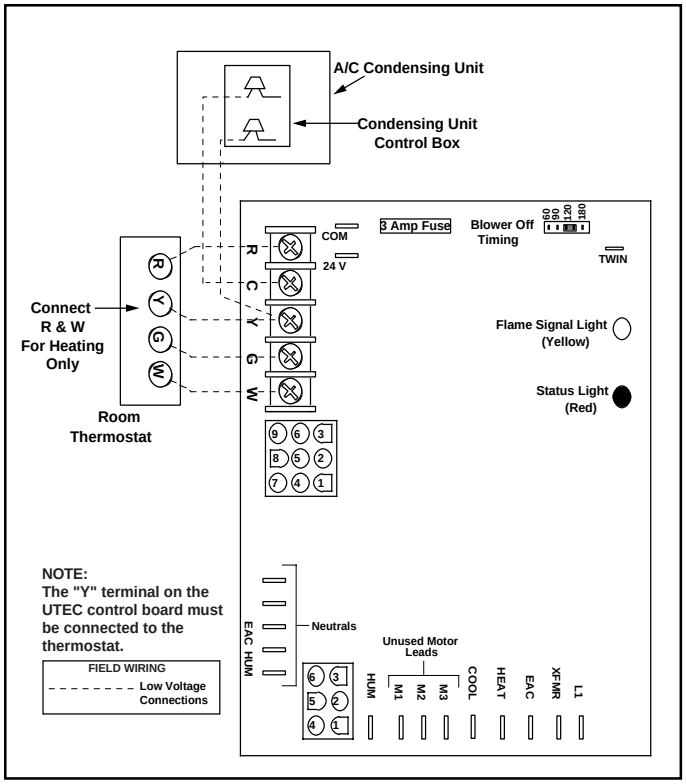


Figure 23. Low Voltage Field, Four-wire Heating/Cooling Applications

OR

Set the heat anticipator according to the manufacturer's recommendations 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.

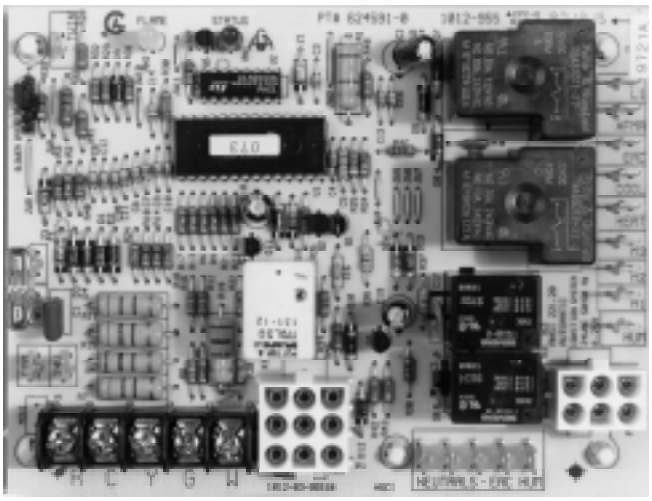


Figure 24.

Features:

A. 90 second delay blower "off" time in cooling mode. LED Diagnostics.
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 25.)
C. Field Adjustable Fan Settings (Heating Mode)

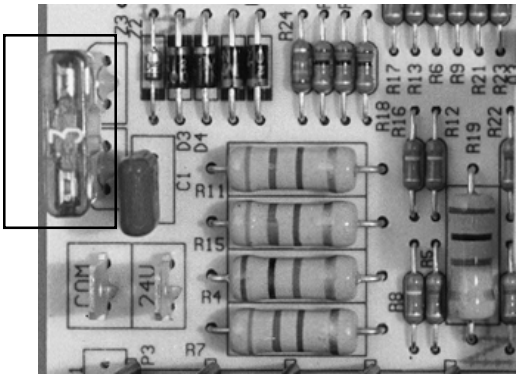


Figure 25.

The off times are field adjustable and may be set from 180, 120, 90, 69 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 26.)

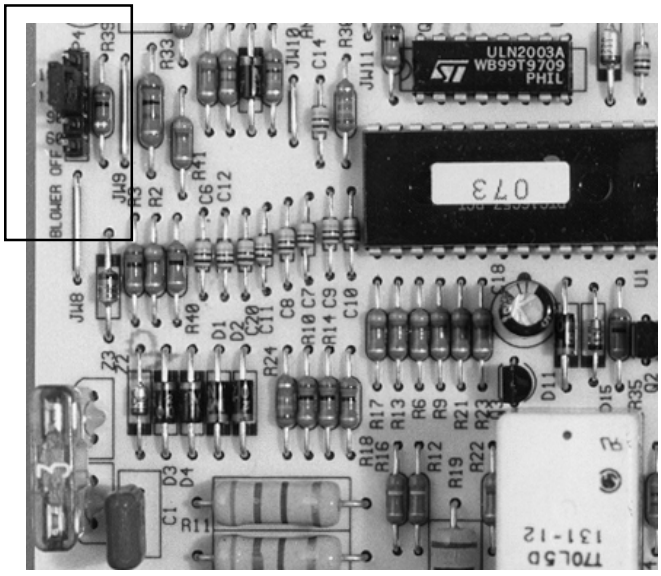


Figure 26.

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 27.)

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 thermostat.

Figure 27.

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 28 for location and Figure 13 on page 17 for Twinning Diagram.

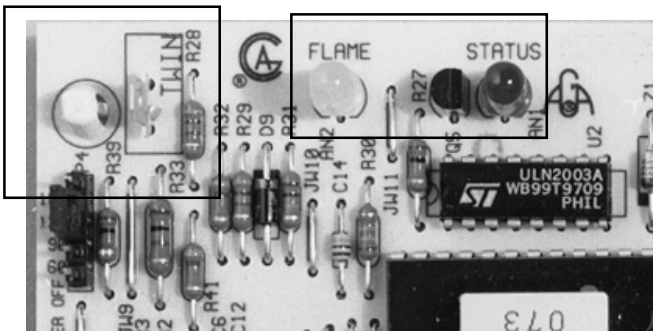


Figure 28.

F. Diagnostic Lights - the diagnostic light feature is to aid the service technician in identifying the nature of the problem. See Figure 28.

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 33.

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 (RC, RD, RL) series incorporates 3 different types of limit controls: (See Figure 29) 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 the burner box cover plate.

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.

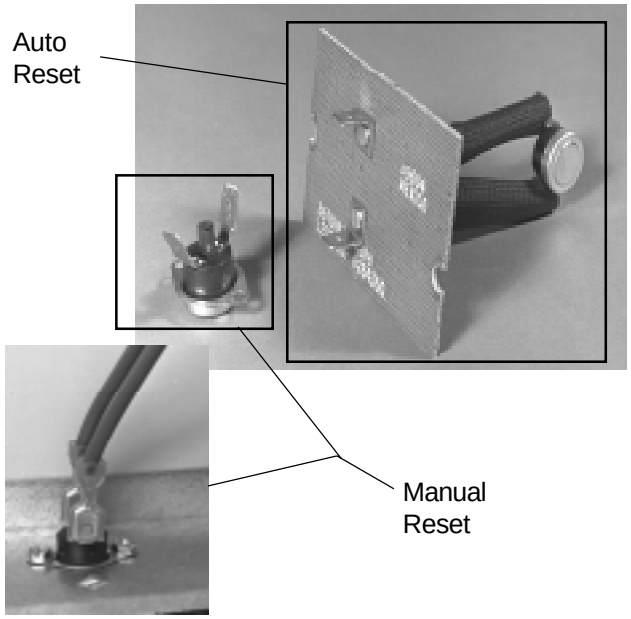


Figure 29.

Main Air Limit Control (See Figure 30)
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.

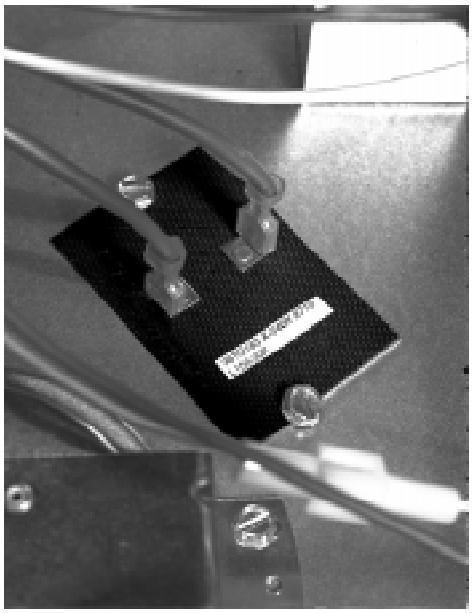


Figure 30.

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.

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

Roll Out Limit Control (See Figure 29)
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.

Figure 31.

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. (See Figure 32.)
5. Depress reset button to reset switch.
6. Continuity or 0 ohms should now be read. If not, replace switch. (See Figure 31.)

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 32.

Draft Inducer Motor (See Figure 33.)
All models use an induced draft combustion blower mounted on the outlet side of a secondary 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 37.) The blower is made of plastic, and is driven by a 115V permanent split capacitor motor. The same (part #) blower is used on all models of all series.

Figure 33.

There is however, a different (size) restrictor orifice for different BTU capacities, mounted on the inlet (back) side of the blower. When replacing a combustion blower, it is essential to transfer the restrictor from the old housing to the new one, before blower is mounted on collector box. The only exception is the 40,000 BTU, which uses the restrictor supplied. All others are transferred. (See Figure 34.)

Figure 34.

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.
5. If no voltage is read, replace control.

Figure 35.

Pressure Switch (See Figure 38.)

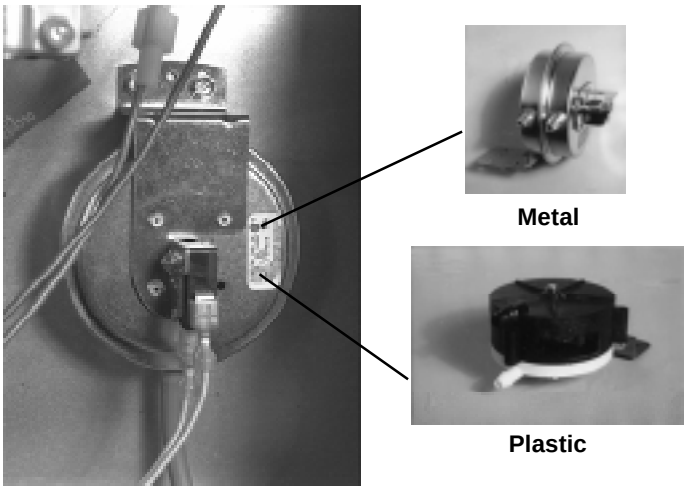


Figure 36.

All G6RC, RD, and RL use a differential type pressure switch. The purpose of this switch is to insure that a draft has been established through the heat exchangers. (See Figure 37.) The combustion blower creates a differential in negative pressure (less than atmospheric between the inlet side of the combustion blower) and the inside of the burner box of the furnace. This switch is normally open and closes on a drop in pressure, read in negative inches of water column. See Table 7.

G6RD-93+ model only: In addition to the differential switch above, the 93+ furnace also incorporates a vent pressure switch. A normally closed switch, it opens upon an increase in positive pressure in the vent system. If a positive pressure in the vent gets above +1.05" W.C., the switch will open, shutting down the system. Switch will stay closed as long as the pressure stays below +0.87" W.C. in the vent. Look for obstruction in vent if this switch goes open. See Table 7.

Once the ventor motor builds up to speed, and under normal operation conditions, sufficient differential (negative) pressure will be created to close the differential pressure switch, and keep it closed for the whole heating cycle. Under abnormal conditions, such as vendor motor failure or restricted vent pipe, combustion air pipe, leak around vendor assembly, or water drainage problem, sufficient differential 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 going closed, insufficient differential (negative) pressure is not being created. See Table 7 for open and close setting.

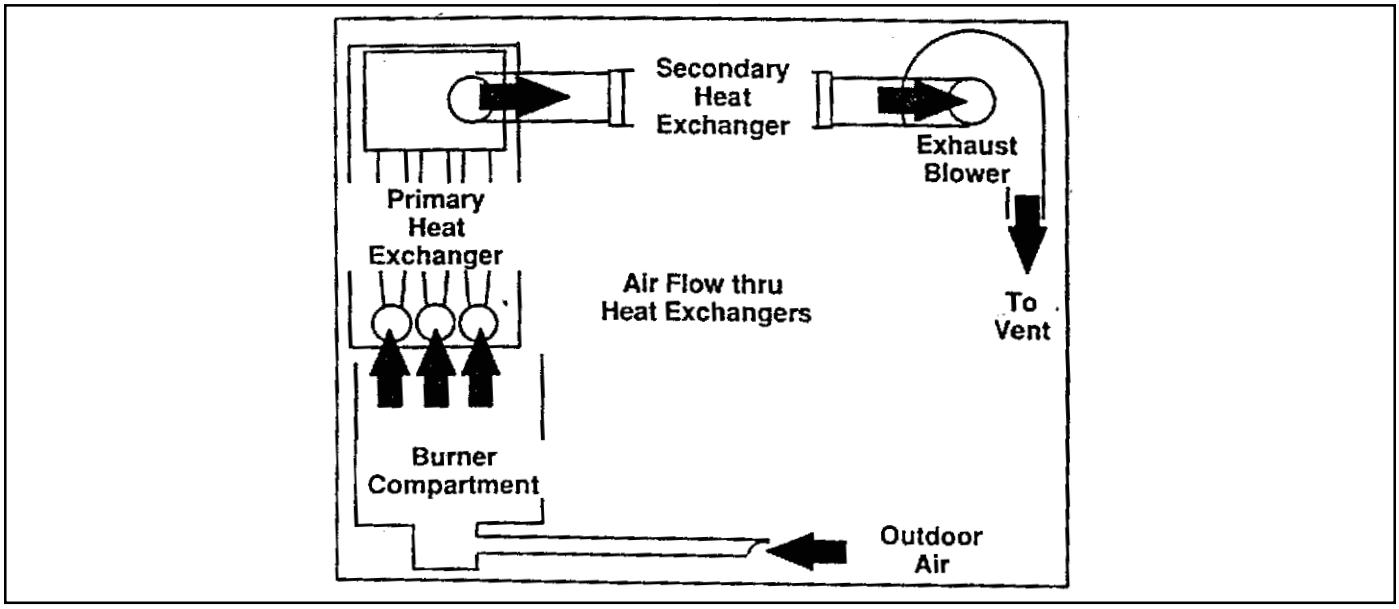


Figure 37.

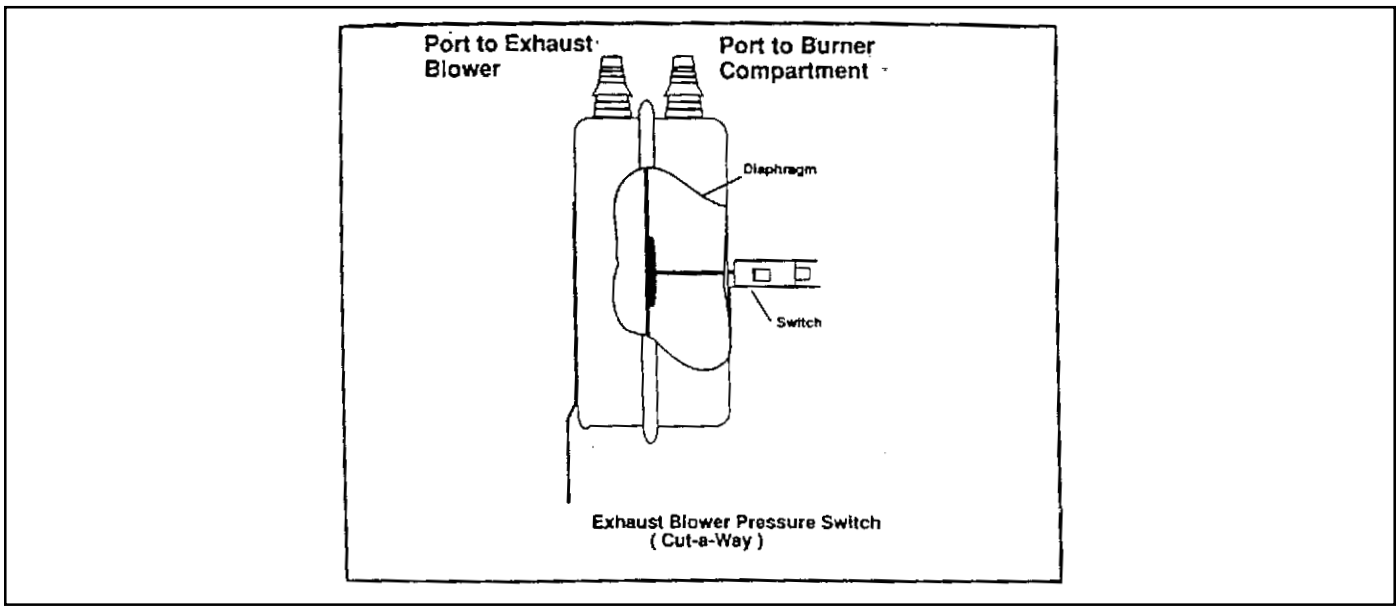


Figure 38.

Settings		Application	Nordyne Part #	Switch Type
Open	Close			
-1.55	-1.74	90+ upflow	632252	diff. - dual port (NO)
-1.18	-1.34	90+ upflow hi alt	632200	diff. - dual port (NO)
-1.65	-1.8	90+ downflow	632304	diff. - dual port (NO)
-0.82	-1	93.5+ upflow	632301	diff. - dual port (NO)
+1.05	+0.87	93.5+ upflow	632302	diff. - dual port (NC)

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

Table 7.

To test for proper differential, install a differential pressure gauge (magnehelic or equivalent) or U Tube as shown in Figure 39. 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 39

Check-out Procedure:

1. Remove orange wires from pressure switch. Place tees in the hose connecting pressure switch to burner box and collector box.
2. Connect a Magnehelic or Inclined Manometer to tee.
3. Start induce draft motor.
4. Negative pressure created by the induced draft motor must be greater than 1.75" 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 differential reading will not pull down to -1.75" W.C. (1-.80 G6RL 040/060), then there could be several reasons why.

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

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) Differential 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 water building up in flue, piping not properly supported or sloped)

2. Leak (lack of restriction) on inlet side. Inducer inlet leaking, inducer blower wheel loose, leak in heat exchanger, or wrong restrictor orifice. The most common occurrance is improper or slow condensate removal, or dry tap.

3. To test for restriction in outlet pipe (exhaust) to verify problem is outside of furnace, disconnect exhaust for test period only and start furnace. If furnace starts, look for problem in vent pipe. Reconnect after testing.

Higher than normal negative pressure at burner box (acts to open switch)

1. Restricted combustion air inlet pipe may be blocked, too long, too small, or have too many elbows.

2. To verify if problem is in inlet pipe, disconnect pressure switch hose at burner box and start furnace. If furnace starts, look for problems mentioned above in inlet pipe. Note: burner box pressure opposes (acts to open) contacts on differential switch.

NOTE: Blower Pressure - Burner Pressure = Differential Pressure

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

Hot Surface Ignitor (See Figure 40.)
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.

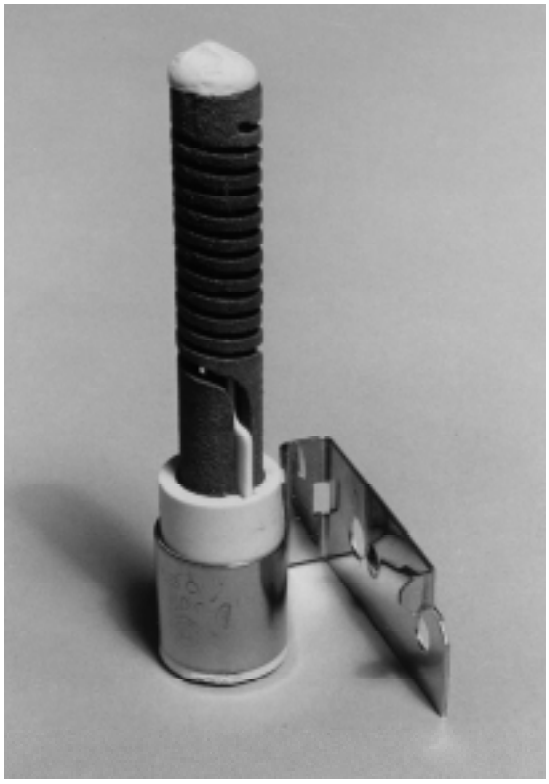


Figure 40.

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 41.)
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 42.)
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 41.

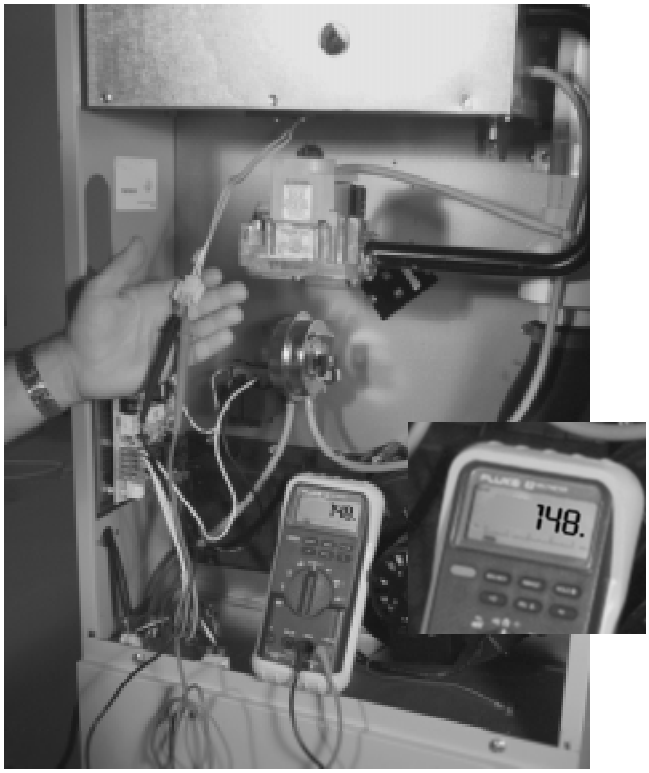


Figure 42.

Gas Valve (See Figure 43.)
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 44) and LP gas should be 10" W.C. (see Figure 43).

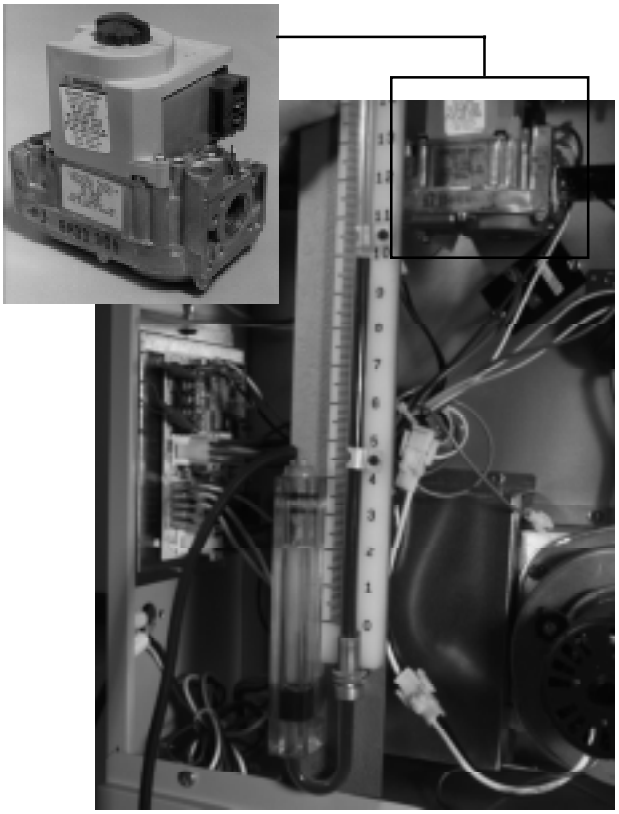


Figure 43.

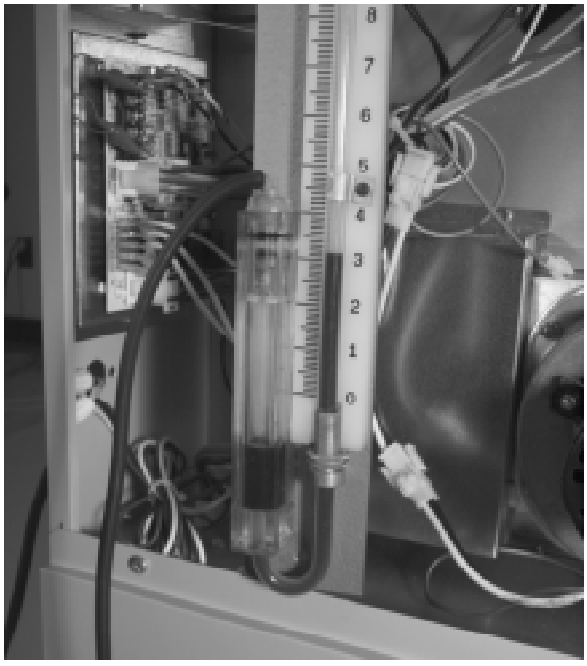


Figure 44.

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 45.)
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 45.

Adjusting Manifold Pressure
1. With gas valve in the off position, remove the outlet pressure cap screw or valve 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 46.)
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.

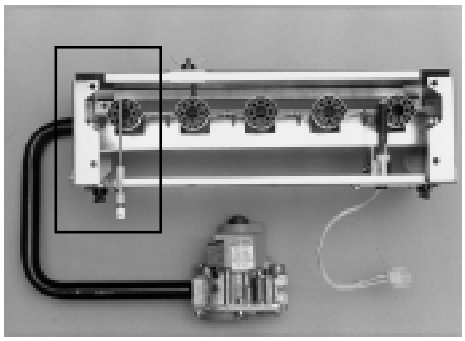


Figure 46.

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 47.) The board will close the gas valve if the micro amp reading is less than 0.5 uA.

Figure 47.

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 48.)

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

Figure 48.

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 (See Figure 49)
The G6 uses a tubular type of primary heat exchanger made from aluminized steel and stainless steel secondary. Inside the heat exchanger are the tubulators, located behind the collector box (Figure 49), inside each tube. (See Figure 50.) They help in the efficiency of the combustion process.

Figure 49.

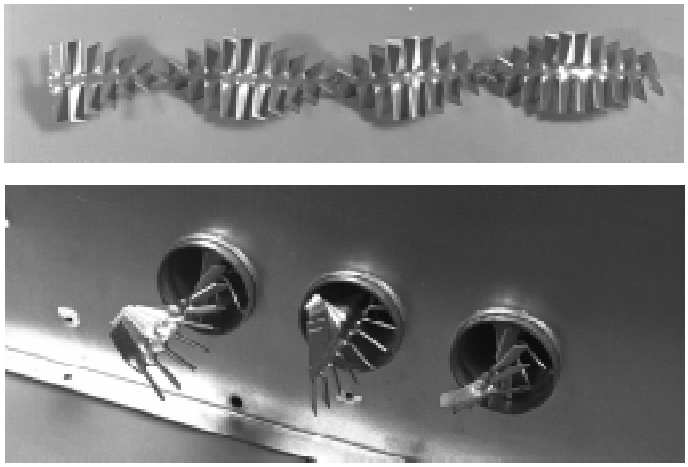


Figure 50.

BLOWER PERFORMANCE

Proper Airflow - Checking Temperature Rise. (See Table 3, 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 100°F and 130°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. Dirty secondary heat exchanger
2. Too much gas pressure
3. 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.

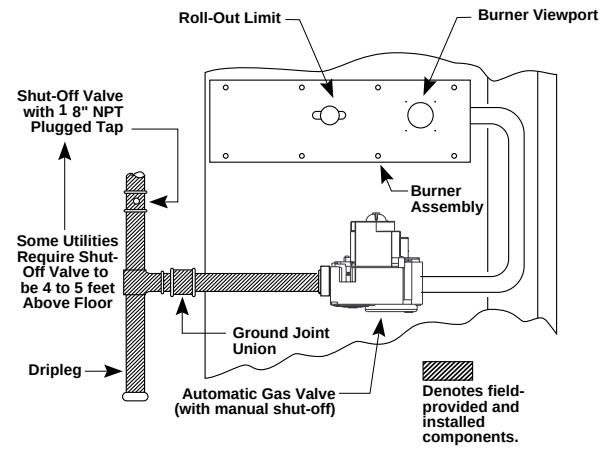
VERIFYING AND ADJUSTING FIRING RATE

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.

G6RC & G6RD Typical Left Side Entry



G6RL Right Side Entry

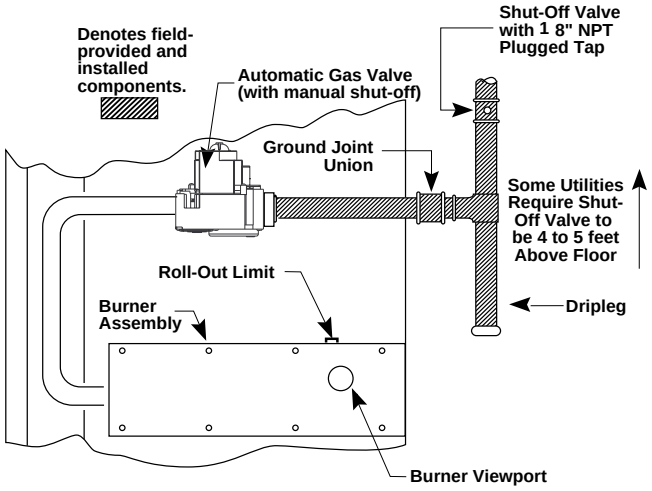


Figure 51. Typical Gas Service Connection

EXAMPLE 1

Elevation	3,890 feet
Type of gas	Natural
Furnace model	G6RC100C-16
Orifice as shipped	#45 Drill

What burner orifices are needed?

The required input for 3890 feet is 84,000 Btuh or 16% less than the sea level rating of 100,000 Btuh.

See Table 6 for natural gas, find the Furnace Model Number and follow across the table for the elevation 2000-4000 column. From the table, choose a #46 orifice. Install a #46 orifice in every burner and check the firing rate per the VERIFYING AND ADJUSTING FIRING RATE section. The firing rate in this example must not exceed 84,000 Btuh.

EXAMPLE 2

Elevation	5,500 feet
Type of gas	Propane
Furnace model	G6RC100C-16
Orifice in Natural to LP Conversion Kit	# 55 drill

What burner orifices are needed?

The required input for 5500 feet is 76,000 Btuh or 24% less than the sea level rating of 100,000 Btuh.

See Table 6 for LP gas, find the Furnace Model Number and follow across the table for the elevation 4000-6000 column. From the table, choose a #56 orifice. Install a #56 orifice in every burner and adjust the manifold pressure to 10.0 inches water column. The firing rate in this example must not exceed 76,000 Btuh.

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.

United States Orifices

Furnace Model Number	No. of Burners	Elevation 0 - 2000		Elevation 2000-4000		Elevation 4000-6000		Elevation 6000-8000		Elevation 8000-10000		Elevation 8000-10000	
		Nat	LP	Nat	LP	Nat	LP	Nat	LP	Nat	LP	Nat	LP
G(*)R(C,D,L)040C-X	2	44	55	45	55	48	56	48	56	49	57	50	58
G(*)R(C,D,L)060C-X	3	44	55	45	55	48	56	48	56	49	57	50	58
G(*)R(C,D,L)080C-X	4	44	55	45	55	48	56	48	56	49	57	50	58
G(*)R(C,D,L)100C-X	5	44	55	45	55	48	56	48	56	49	57	50	58
G(*)R(C,D)120C-X	6	44	55	45	55	48	56	48	56	49	57	50	58

Canada Orifices

Furnace Model Number	No. of Burners	Orifice Size Elevation 0 - 2000		Furnace Rating Plate Elevation 0 - 2000		Orifice Size Elevation 2000-4500		Furnace Rating Plate Elevation 2000- 4500	
		Nat	LP	Input	Output	Nat	LP	Input	Output
G(*)R(C,D,L)040C-X	2	44	55	40,000	37,000	45	55	36,000	33,300
G(*)R(C,D,L)060C-X	3	44	55	60,000	56,000	45	55	54,000	50,400
G(*)R(C,D,L)080C-X	4	44	55	80,000	74,000	45	55	72,000	66,600
G(*)R(C,D,L)100C-X	5	44	55	100,000	92,000	45	55	90,000	82,800
G(*)R(C,D)120C-X	6	44	55	120,000	110,000	45	55	107,000	98,100

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

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.

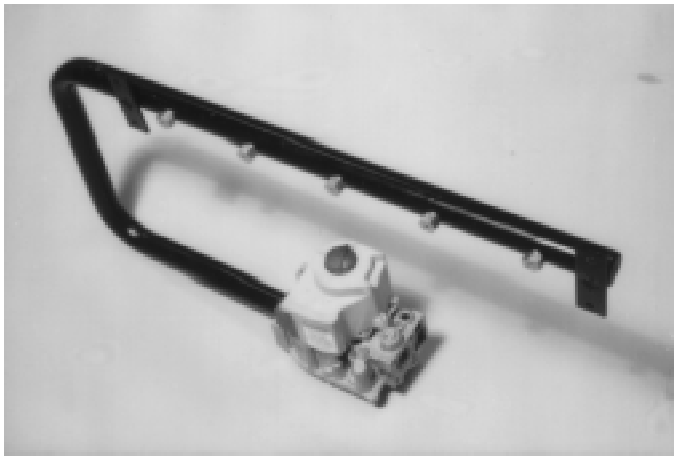


Figure 52. Gas Valve and Manifold

ACCESSORIES

Dual Fuel Kit (Figure 53)

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 52)
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

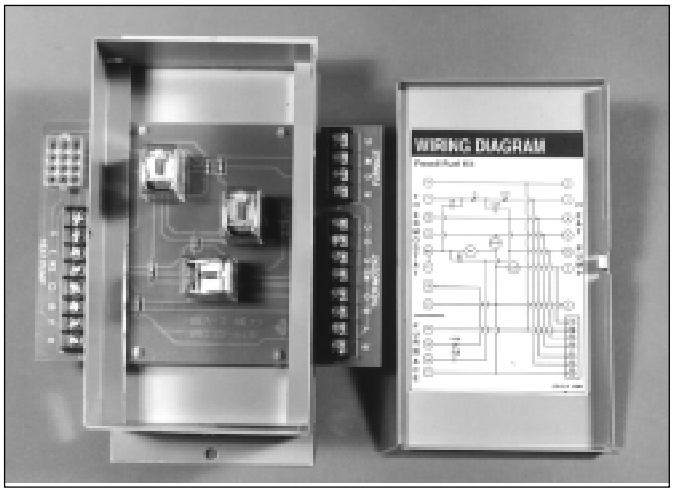


Figure 53. Dual Fuel Kit

Figure 54. Electronic Air Cleaner

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