INSTALLATION INSTRUCTIONS

A96DFMV

Warm Air Gas Furnace
Downflow Air Discharge

This manual must be left with the homeowner for future reference.

This is a safety alert symbol and should never be ignored. When you see this symbol on labels or in manuals, be alert to the potential for personal injury or death.

⚠ CAUTION

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional installer (or equivalent), service agency or the gas supplier.

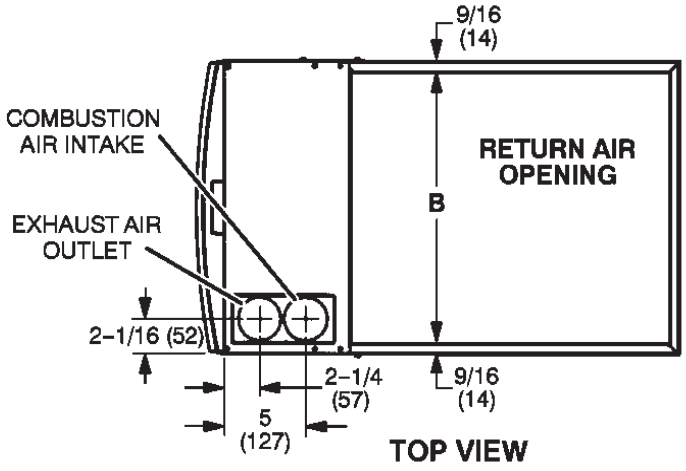
TABLE OF CONTENTS

Unit Dimensions 2
Parts Arrangement 3
Gas Furnace 4
Shipping and Packing List 4
Safety Information 4
Use of Furnace as a Construction Heater 5
General 6
Setting Equipment 6
Filters 9
Duct System 9
Pipe and Fittings Specifications 10
Joint Cementing Procedure 11
Venting Practices 12
Vent Piping Guidelines 12
Gas Piping 20
Electrical 22
Integrated Control 29
Blower Motor Performance 30
Unit Start Up 35
Gas Pressure Measurement 36
High Altitude Information 36
Proper Combustion 36
Other Unit Adjustments 37
Heating Sequence of Operation 38
Service 40
Planned Service 42
Integrated Control Diagnostic Codes 43
Configuring Unit Size Codes 44
Troubleshooting 45
Repair Parts List 51

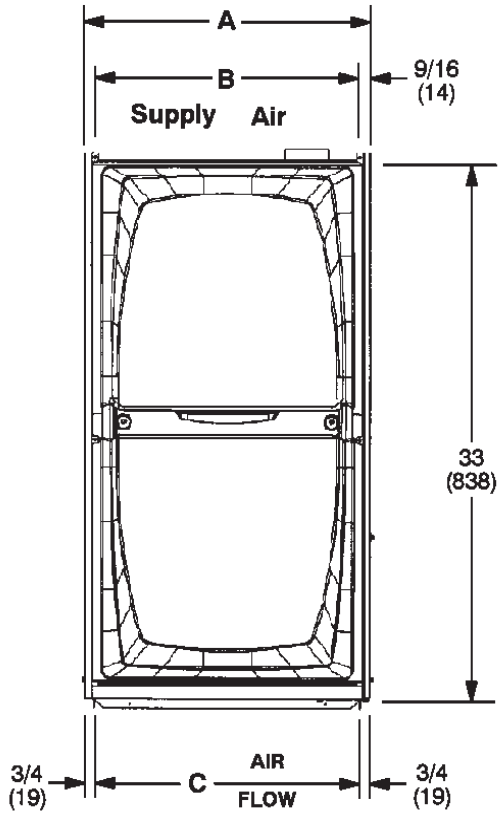
506552-01

Manufactured By
Allied Air Enterprises, Inc.
A Lennox International, Inc. Company
215 Metropolitan Drive
West Columbia, SC 29170

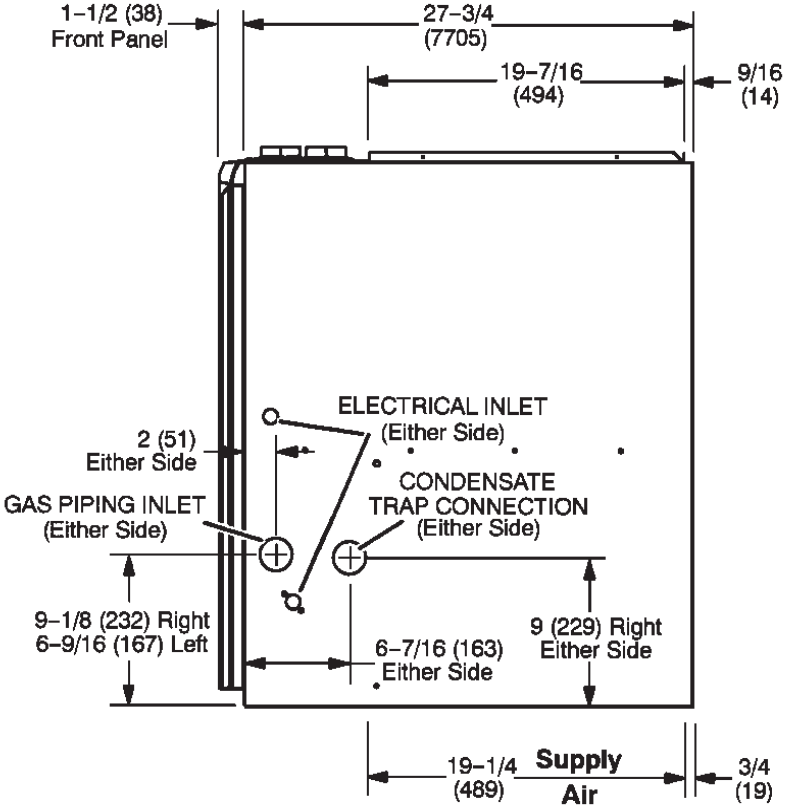
Unit Dimensions - inches (mm)



TOP VIEW



FRONT VIEW



SIDE VIEW

Model Number	A		B		C		D	
	in.	mm	in.	mm	in.	mm	in.	mm
A96DFMV070B12S	17-1/2	446	16-3/8	416	16	406	7-5/8	194
A96DFMV090C12S A96DFMV090C16S A96DFMV090C20S A96DFMV110C20S	21	533	19-7/8	505	19-1/2	495	9-3/8	238

A96DFMV Exploded View

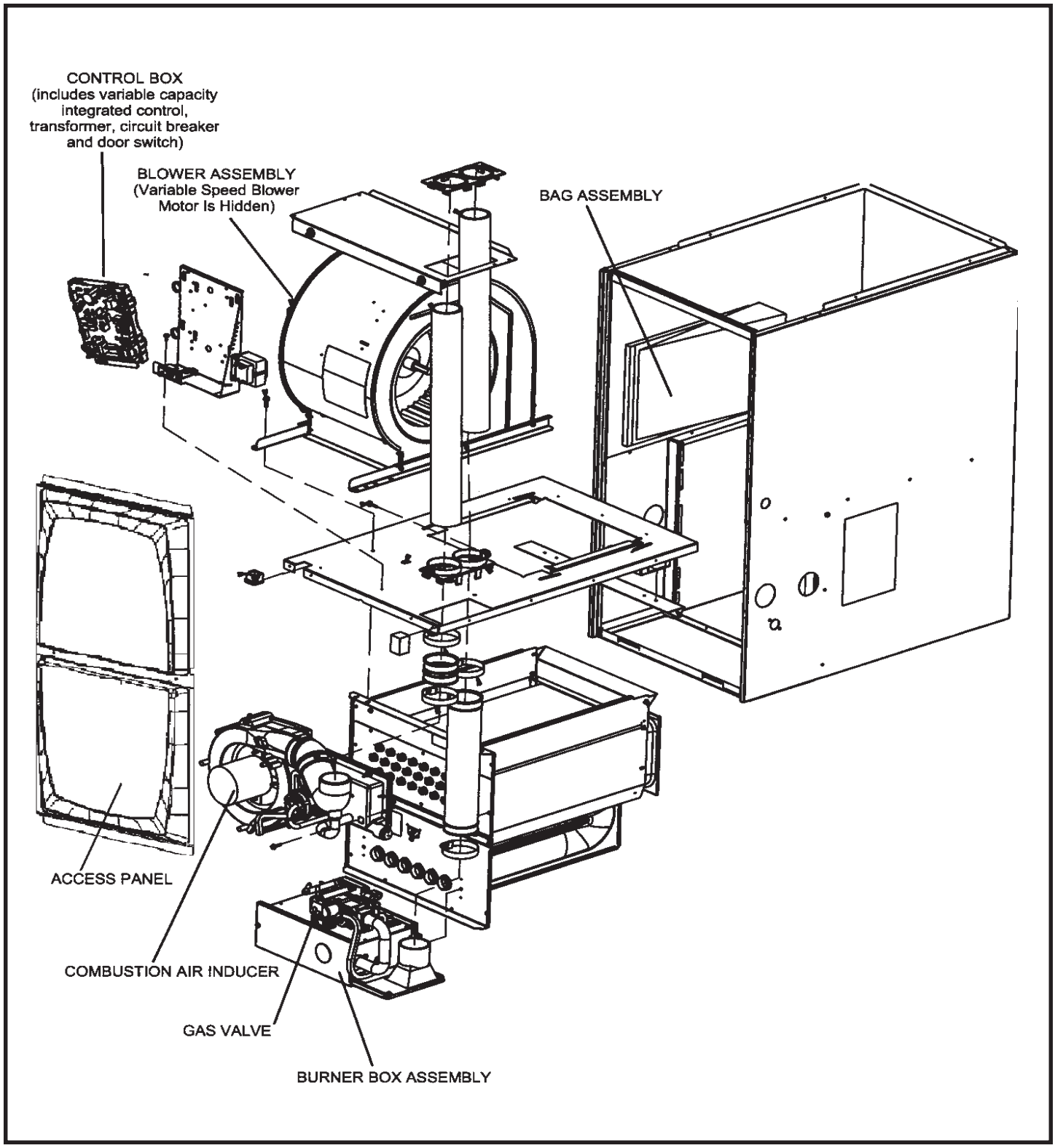


Figure 1

A96DFMV Gas Furnace
The A96DFMV Category IV gas furnace is equipped with a variable capacity, varable speed integrated control. Each A96DFMV is shipped ready for installation in the Downflow air discharge position.

The furnace is equipped for installation in natural gas applications only. A changeover kit must be ordered for LP/ propane applications.

The A96DFMV must be installed only as a Direct Vent gas central furnace

NOTE: *In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged outdoors. See Figure 2 for applications including roof termination.*

DIRECT VENT INSTALLATION

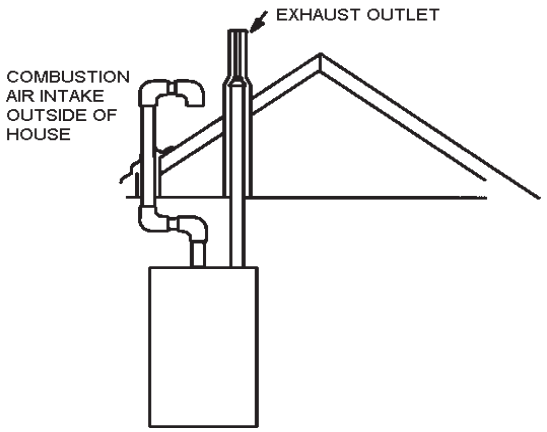


Figure 2

Shipping and Packing List
1 - Assembled A96DFMV unit.
1 - Bag assembly containing the following:
- 3 - Wire nuts
- 1 - Snap bushing
- 1 - Snap Plug
- 1 - Wire tie
- 1 - Condensate trap
- 1 - Condensate trap cap
- 1 - Condensate trap cap clamp
- 1 - 3/8” NPT to 1/2” PVC fitting

Check equipment for shipping damage. If you find any damage, immediately contact the last carrier.

Please refer to specification sheets for available accessories.

Safety Information

DANGER

DANGER OF EXPLOSION!

There are circumstances in which odorant used with LP/ Propane gas can lose its scent. In case of a leak, LP/ Propane gas will settle close to the floor and may be difficult to smell. An LP/Propane leak detector should be installed in all LP applications.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional installer (or equivalent), service agency or the gas supplier.

CAUTION

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

Use only the type of gas approved for use with this furnace. Refer to unit nameplate.

Building Codes
In the USA, installation of gas furnaces must conform with local building codes. In the absence of local codes, units must be installed according to the current National Fuel Gas Code (ANSI Z223.1/NFPA 54). The National Fuel Gas Code is available from the **American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036**.

Installed Locations
In Canada, installation must conform with current National Standard of Canada CSA-B149 Natural Gas and Propane Installation Codes, local plumbing or waste water codes and other applicable local codes.

The furnace is designed for installation clearances to combustible material as listed on the unit nameplate and in the Tables 1 and 2. Accessibility and service clearances must take precedence over fire protection clearances.

NOTE: *For installation on combustible floors, the furnace shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring.*

For installation in a residential garage, the furnace must be installed so that the burner(s) and the ignition source are located no less than 18 inches (457 mm) above the floor. The furnace must be located or protected to avoid physical damage by vehicles. When a furnace is installed in a public garage, hangar, or other building that has a hazardous atmosphere, the furnace must be installed according to recommended good practice requirements and current National Fuel Gas Code or CSA B149 standards.

Note: *Furnace must be adjusted to obtain a temperature rise (100% percent capacity) within the range (s) specified on the unit nameplate. Failure to do so may cause erratic limit operation and may also result in premature heat exchanger failure.*

This A96DFMV furnace must be installed so that its electrical components are protected from water.

Installed in Combination with a Cooling Coil
When this furnace is used with cooling units, it shall be installed in parallel with, or on the upstream side of, cooling units to avoid condensation in the heating compartment. With a parallel flow arrangement, a damper (or other means to control the flow of air) must adequately prevent chilled air from entering the furnace. If the damper is manually operated, it must be equipped to prevent operation of either the heating or the cooling unit, unless it is in the full **HEAT** or **COOL** setting. See Figure 3.

Heating Unit Installed Parallel to Air Handler Unit

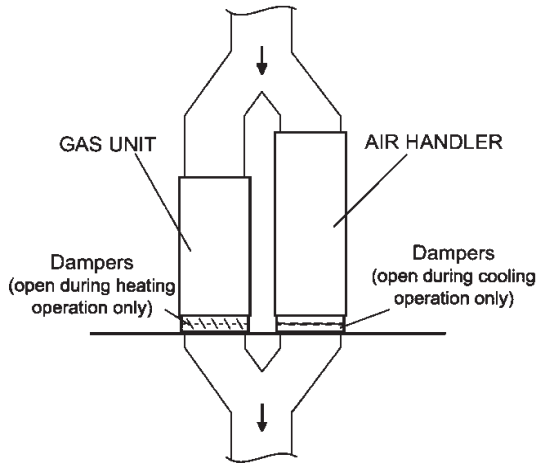


Figure 3

When installed, this furnace must be electrically grounded according to local codes. In addition, in the United States, installation must conform with the current National Electric Code, ANSI/NFPA No. 70. The National Electric Code (ANSI/NFPA No. 70) is available from the following address:

National Fire Protection Association
1 Battery March Park
Quincy, MA 02269

NOTE: *This furnace is designed for a minimum continuous return air temperature of 60°F (16°C) or an intermittent operation down to 55°F (13°C) dry blub for cases where a night setback thermostat is used. Return air temperature must not exceed 85°F (29°C)dry bulb.*

In Canada, all electrical wiring and grounding for the unit must be installed according to the current regulations of the Canadian Electrical Code Part I (CSA Standard C22.1) and/or local codes.

⚠ CAUTION

Do Not set thermostat below 60° F (16° C) in heating mode. Setting thermostat below 60° F (16° C) reduces the number of heating cycles. Damage to the unit may occur that is not covered by the warranty.

The A96DFMV furnace may be installed in alcoves, closets, attics, basements, garages, and utility rooms.

This furnace design has not been approved for installation in mobile homes, recreational vehicles, or outdoors.

Use of Furnace as Construction Heater
These units are not recommended for construction heater during any phase of construction. Very low return air temperature, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

These units may be used for heating of buildings or structures under construction, if the following conditions are met:

- The vent system must be permanently installed per these installation instructions.
- A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is not allowed.
- The return air duct must be provided and sealed to the furnace.
- Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.
- Air filters must be installed in the system and must be maintained during construction.

- Air filters must be replaced upon construction completion.
- The input rate and temperature rise must be set per the furnace rating plate.
- One hundred percent (100%) outdoor air must be provided for combustion air requirements during construction.
- The furnace heat exchanger, components, duct system, air filters and evaporator coils must be thoroughly cleaned following final construction cleanup.
- All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

General

⚠ WARNING

Product Contains Fiberglass Wool.

Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

Allied Air Enterprises, Inc.
215 Metropolitan Drive
West Columbia, SC 29170

⚠ CAUTION

These units should not be installed in areas normally subject to freezing temperatures.

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

In addition to the requirements outlined previously, the following general recommendations should be considered when installing one of these furnaces:

- Place the furnace as close to the center of the air distribution system as possible. The furnace should also be located close to the chimney or vent termination point.
- When the furnace is installed in an attic or other insulated space, keep insulation away from the furnace.
- When the furnace is installed in an unconditioned space, consider provisions required to prevent freezing of condensate drain system.

Installation – Setting Equipment

⚠ WARNING

Do not install the furnace on its front or its back. See Figure 5. Do not connect the return air ducts to the back of the furnace. Doing so will adversely affect the operation of the safety control devices, which could result in personal injury or death.

Select a location that allows for the required clearances that are listed on the unit nameplate. Also consider gas supply connections, electrical supply, vent connection, condensate trap and drain connections, and installation and service clearances (24 inches [610 mm] at unit front). The unit must be level from side to side, for proper operation. *It is recommended to tilt the unit slightly toward the drain to insure proper drainage. See Figure 4.*

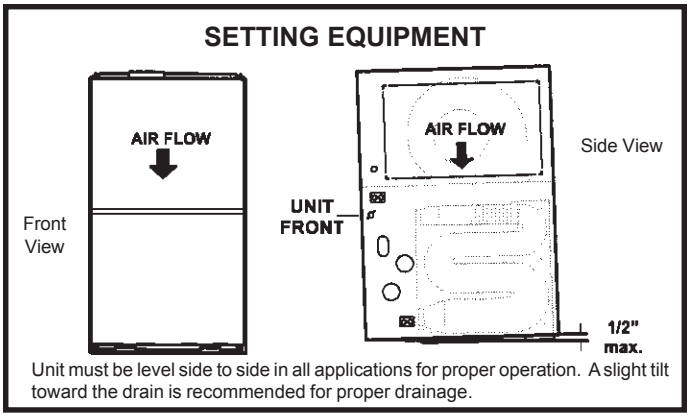


Figure 4

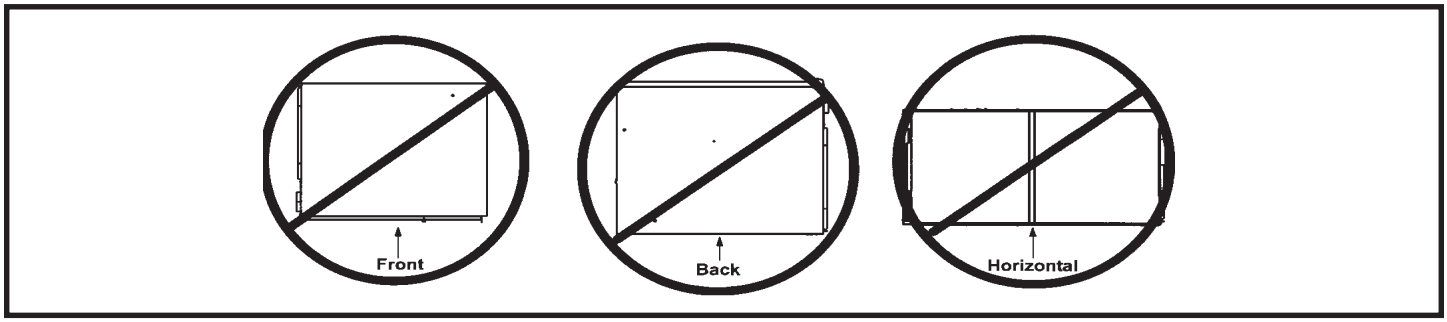


Figure 5

NOTE: *The 1/2 hp blower motor used in this unit is equipped with three flexible legs and one rigid leg. The rigid leg is equipped with a shipping bolt and a flat white plastic washer (rather than the rubber mounting grommet used with a flexible mounting leg).* ***The bolt and washer must be removed before the furnace is placed into operation.*** *After the bolt and washer have been removed, the rigid leg will not touch the blower housing.*

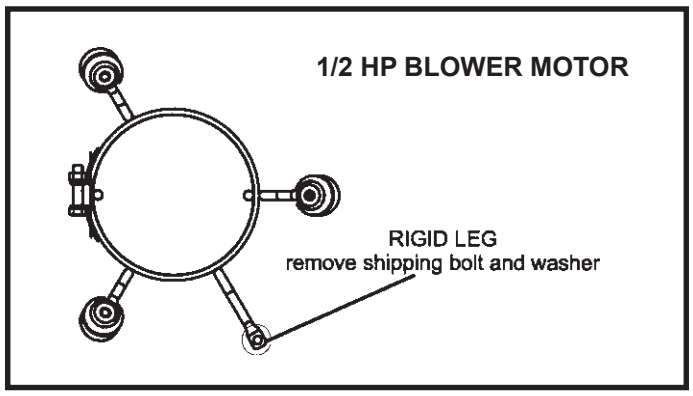


Figure 6

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in Figure 7.

⚠ WARNING

Blower access panel must be securely in place when blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

⚠ WARNING

Improper installation of the furnace can result in personal injury or death. Combustion and flue products must never be allowed to enter the return air system or air in the living space. Use sheet metal screws and joint tape to seal return air system to furnace.

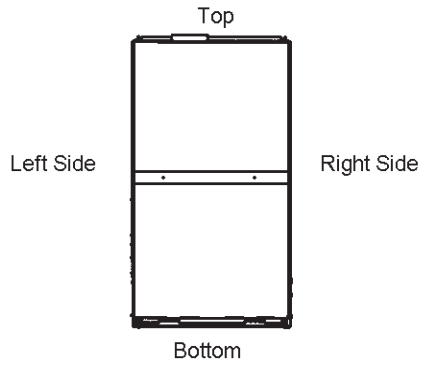
In platform installations with furnace return, the furnace should be sealed airtight to the return air plenum. A door must never be used as a portion of the return air duct system. The base must provide a stable support and an airtight seal to the furnace. Allow absolutely no sagging, cracks, gaps, etc.

For no reason should return and supply air duct systems ever be connected to or from other heating devices such as a fireplace or stove, etc. Fire, explosion, carbon monoxide poisoning, personal injury and/or property damage could result.

The unit may be installed three ways in downflow applications: on non-combustible flooring, on combustible flooring using a base, or on a reverse flow cooling coil cabinet. Do not drag the unit across the floor in the downflow position. Flange damage will result.

Refer to Figure 7 for clearances in downflow applications.

Downflow Application Installation Clearances



Top	0
*Front	0
Back	0
Sides	0†
Vent	0
Floor	NC‡

* Front clearance in alcove installation must be 24 in. (610 mm). Maintain a minimum of 24 in. (610 mm) for front service access.
† Allow proper clearances to accommodate condensate trap and vent pipe installation.
‡ The furnace may be Installed on a combustible wood floor if an optional base is installed between the furnace and the combustible floor.

Figure 7

Installation on Non-Combustible Flooring (Figure 8)

1. Cut floor opening keeping in mind clearances listed on unit rating plate. Also keep in mind gas supply connections, electrical supply, flue and air intake connections and sufficient installation and servicing clearances. See Table 1 for correct floor opening size.
2. Flange warm air plenum and lower the plenum into the opening.
3. Set the unit over the plenum and seal the plenum to the unit.
4. Ensure that the seal is adequate.

Non- Combustible Floor Opening Size

Cabinet Width	Front to Rear		Side to Side	
	in.	mm	in.	mm
B Cabinet (17.5")	19 - 3/4	502	16 - 5/8	422
C Cabinet (21")	19 - 3/4	502	20-1/8	511

NOTE: *Floor opening dimensions listed are 1/4 inch (6 mm) larger than the unit opening. See dimension drawing on page 2.*

Table 1

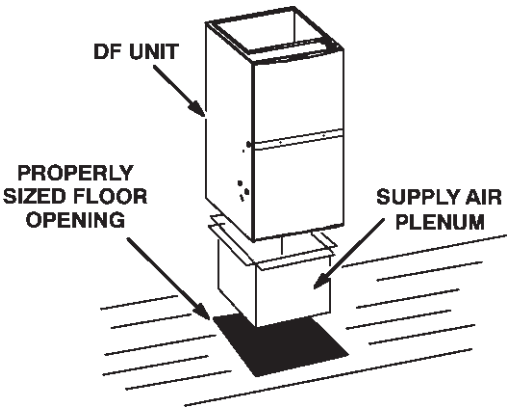


Figure 8

Installation on Combustible Flooring (Figure 9)

1. When unit is installed on a combustible floor, a downflow combustible flooring base must be installed between the furnace and the floor. The base must be ordered separately. See Table 2 for opening size to cut in floor.

⚠ CAUTION

The furnace and combustible flooring base shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring. units should not be installed in areas normally subject to freezing temperatures.

Combustible Flooring Base Opening Size

Cabinet Width	Catalog Number	Front to Rear		Side to Side	
		in.	mm	in.	mm
B Cabinet (17.5")	11M60	22	559	18 - 3/4	476
C Cabinet (21")	11M61	22	559	22 - 3/4	578

Table 2

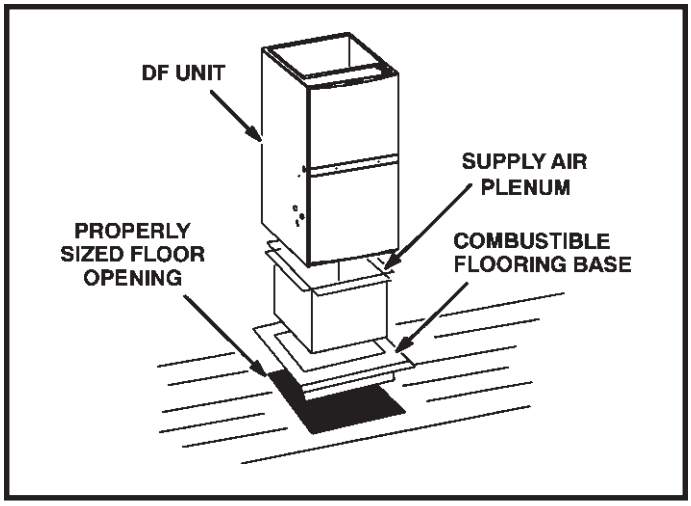


Figure 9

2. After opening is cut, set combustible flooring base into opening.
3. Check fiberglass strips on combustible flooring base to make sure they are properly glued and positioned.
4. Lower supply air plenum into combustible flooring base until plenum flanges seal against fiberglass strips.

NOTE - Be *careful not to damage fiberglass strips. Check for a tight seal.*

5. Set the furnace over the plenum.
6. Ensure that the seal between the furnace and plenum is adequate.

Installation on Cooling Coil Cabinet (Figure 10)

NOTE: *Downflow combustible flooring base is not used.*

1. Refer to reverse flow coil installation instructions for correctly sized opening in floor and installation of cabinet.
2. When cooling cabinet is in place, set and secure the furnace according to the instructions that are provided with the cooling coil. Secure the furnace to the cabinet.
3. Seal the cabinet and check for air leaks.

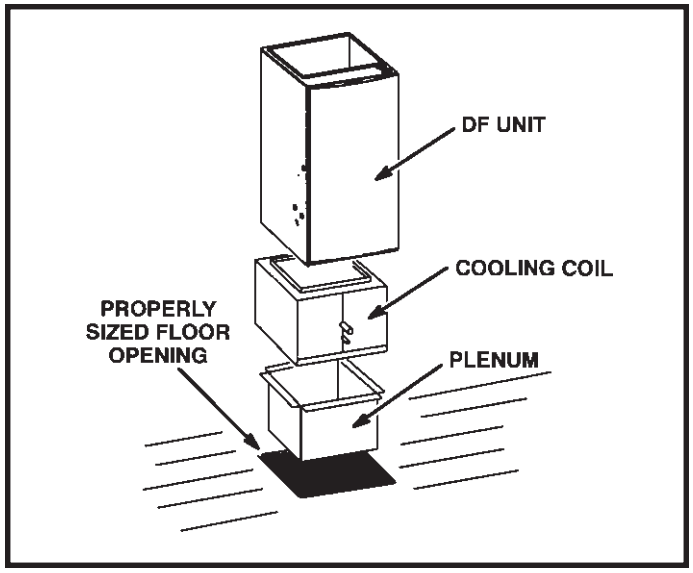


Figure 10

Return Air Opening - Downflow Units

Return air may be brought in only through the top opening of a furnace installed in the downflow position. The following steps should be taken when installing plenum:

1. Bottom edge of plenum should be flanged with a hemmed edge (See figure 11 or 12).
2. Sealing strips should be used to ensure an airtight seal between the cabinet and the plenum.
3. In all cases, plenum should be secured to top of furnace using sheet metal screws.
4. Make certain that an adequate seal is made.

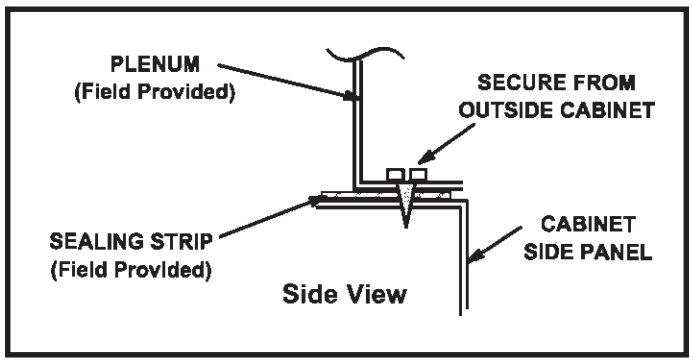


Figure 11

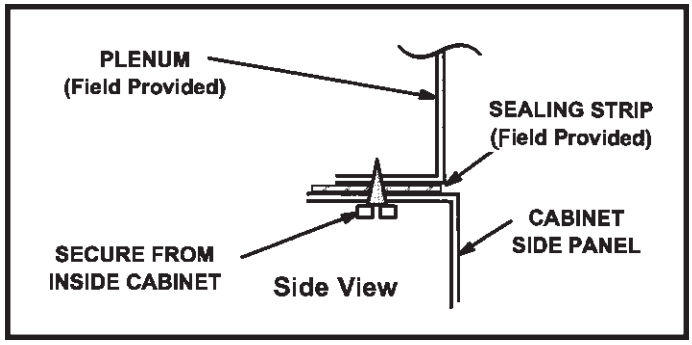


Figure 12

Filters

This unit is not equipped with a filter or rack. A field provided filter is required for the unit to operate properly. Table 3 lists recommended filter size.

A filter must be in place whenever the unit is operating.

Furnace Cabinet Width	Filter Size
B Cabinet (17-1/2")	16 X 25 X 1
C Cabinet (21-1/2")	

Table 3

Duct System

Use industry approved standards to size and install the supply and return air duct system. This will result in a quiet and low static system that has uniform air distribution.

NOTE: *Operation of this furnace in heating mode (indoor blower operating at selected heating speed) with an external static pressure which exceeds 0.8 inches w.c. may result in erratic limit operation.*

Return Air Plenum

Return air must not be drawn from a room where this furnace, or any other gas fueled appliance (Le., water heater), or carbon monoxide producing device (Le., wood fireplace) is installed. When return air is drawn from a room, a negative pressure is created in the room. If a gas appliance is operating in a room with negative pressure, the flue products can be pulled back down the vent pipe and into the room. This reverse flow of the flue gas may result in incomplete combustion and the formation of carbon monoxide gas. This toxic gas might then be distributed throughout the house by the furnace duct system.

Use fiberglass sealing strips, caulking, or equivalent sealing method between the plenum and the furnace cabinet to ensure a tight seal. If a filter is installed, size the return air duct to fit the filter frame.

Pipe & Fittings Specifications

All pipe, fittings, primer and solvent cement must conform with American National Standard Institute and the American Society for Testing and Materials (ANSI/ASTM) standards. The solvent shall be free flowing and contain no lumps, undissolved particles or any foreign matter that adversely affects the joint strength or chemical resistance of the cement. The cement shall show no gelation, stratification, or separation that cannot be removed by stirring. Refer to Table 4 for approved piping and fitting materials.

Piping and Fittings Specifications

Schedule 40 PVC (Pipe)	D1785
Schedule 40 PVC (Cellular Core Pipe)	F891
Schedule 40 PVC (Fittings)	D2466
Schedule 40 CPVC (Pipe)	F441
Schedule 40 CPVC (Fittings)	F438
SDR-21 PVC or SDR-26 PVC (Pipe)	D2241
SDR-21 CPVC or SDR-26 CPVC (Pipe)	F442
Schedule 40 ABS Cellular Core DWV (Pipe)	F628
Schedule 40 ABS (Pipe)	D1527
Schedule 40 ABS (Fittings)	D2468
ABS-DWV (Drain Waste & Vent) (Pipe & Fittings)	D2661
PVC-DWV (Drain Waste & Vent) Pipe & Fittings)	D2665
PRIMER & SOLVENT CEMENT	**ASTM SPECIFICATION**
PVC & CPVC Primer	F656
PVC Solvent Cement	D2564
CPVC Solvent Cement	F493
ABS Solvent Cement	D2235
PVC/CPVC/ABS All Purpose Cement For Fittings & Pipe of the same material	D2564, D2235, F493
ABS to PVC or CPVC Transition Solvent Cement	D3138
CANADIAN PIPE, FITTINGS & SOLVENT CEMENT	**MARKING**
PVC & CPVC Pipe and Fittings	ULCS636
PVC & CPVC Solvent Cement	
ABS to PVC or CPVC Transition Cement	

Table 4

⚠ CAUTION

Solvent cements for plastic pipe are flammable liquids and should be kept away from all sources of ignition. Do not use excessive amounts of solvent cement when making joints. Good ventilation should be maintained to reduce fire hazard and to minimize breathing of solvent vapors. Avoid contact of cement with skin and eyes.

⚠ IMPORTANT

Exhaust and intake connections are made of PVC. Use PVC primer and solvent cement when using PVC vent pipe. When using ABS vent pipe, use transitional solvent cement to make connections to the PVC fittings in the unit.

Use PVC primer and solvent cement or ABS solvent cement meeting ASTM specifications, refer to Table 4. As an alternate, use all purpose cement, to bond ABS, PVC, or CPVC pipe when using fittings and pipe made of the same materials. Use transition solvent cement when bonding ABS to either PVC or CPVC.

Low temperature solvent cement is recommended. Metal or plastic strapping may be used for vent pipe hangers. Uniformly apply a liberal coat of PVC primer for PVC

Canadian Applications Only *- Pipe, fittings, primer and solvent cement used to vent (exhaust) this appliance must be certified to ULC S636 and supplied by a single manufacturer as part of an approved vent (exhaust) system. In addition, the first three feet of vent pipe from the furnace flue collar must be accessible for inspection.*

Table 5 lists the available exhaust termination kits.

Outdoor Termination Kits Usage

A96UHMV	VENT PIPE DIA. (in.)	STANDARD			CONCENTRIC		
		Outdoor Exhaust Accelerator (Dia. X Length)	Outdoor Exhaust Accelerator (Dia. X Length)	Flush Mount Kit	1-1/2" Concentric Kit	2" Concentric Kit	3" Concentric Kit
		1-1/2" X 12"	2" X 12"	51W11 **	71M80 or †44W92††	69M29 or †44W92	60L46 or 44W93†
070	2	YES		YES	YES		
	2-1/2	YES		YES	YES		
	3	YES		YES	YES		
090	2		YES	YES		YES	YES
	2-1/2		YES	YES		YES	YES
	3		YES	YES		YES	YES
110	2		YES	YES		YES	YES
	2-1/2		YES	YES		YES	YES
	3		YES	YES		YES	YES

** Requires field provided and instal/ed 1-1/2" exhaust accelerator.*
*** Kit 51W11 includes a 1-1/2" accelerator which must be used for all 2" and 2-1/2" PVC installations.*
† Termination kits 44W92, 44W93, 30G28 and 81J20 approved for use in Canadian installations.
†† The 44W92 concentric kit includes a 1-1/2" accelerator which must be installed on the exhaust outlet when this kit is used with the 070.

Table 5

Joint Cementing Procedure
All cementing of joints should be done according to the specifications outlined in ASTM D 2855.

⚠ CAUTION

DANGER OF EXPLOSION!

Fumes from PVC glue may ignite during system check. Allow fumes to dissipate for at least 5 minutes before placing unit into operation.

1. Measure and cut vent pipe to desired length.
2. Debur and chamfer end of pipe, removing any ridges or rough edges. If end is not chamfered, edge of pipe may remove cement from fitting socket and result in a leaking joint.
3. Clean and dry surfaces to be joined.
4. Test fit joint and mark depth of fitting on outside of pipe.
5. Uniformly apply a liberal coat of PVC primer for PVC or use a clean dry cloth for ABS to clean inside socket surface of fitting and male end of pipe to depth of fitting socket.
6. Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement should be applied lightly but uniformly to inside of socket. Take care to keep excess cement out of socket. Apply second coat to end of pipe.

NOTE: *Time is critical at this stage. Do not allow primer to dry before applying cement.*

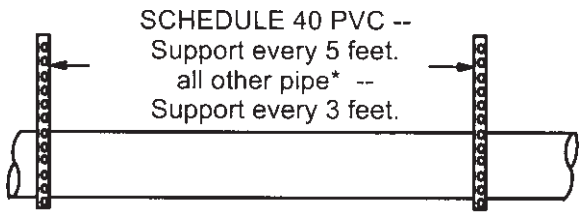
7. Immediately after applying last coat of cement to pipe, and while both inside socket surface and end of pipe are wet with cement, forcefully insert end of pipe into socket until it bottoms out. Turn PVC pipe *1/4* turn during assembly (but not after pipe is fully inserted) to distribute cement evenly. DO NOT turn ABS or cellular core pipe.

NOTE: *Assembly should be completed within 20 seconds after last application of cement. Hammer blows should not be used when inserting pipe.*

8. After assembly, wipe excess cement from pipe at end of fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps may indicate a defective assembly due to insufficient solvent.
9. Handle joints carefully until completely set.

Venting Practices

Piping Suspension Guidelines



** See table4 for allowable pipe.*

NOTE: *Isolate piping at the point where it exits the outside wall or roof in order to prevent transmission of vibration to the structure.*

Wall Thickness Guidelines

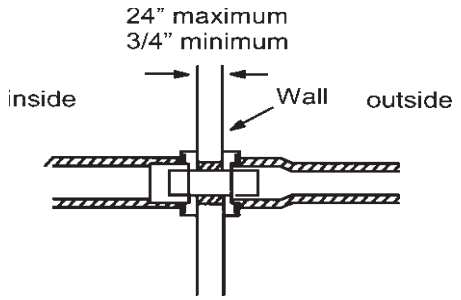
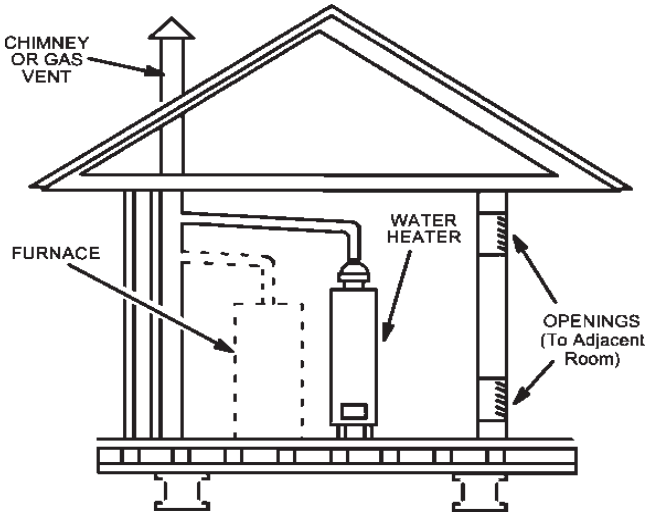


Figure 13

Equipment in Confined Space All Air From Inside



If this furnace replaces a furnace which was commonly vented with another gas appliance, the size of the existing vent pipe for that gas appliance must be checked. Without the heat of the original furnace flue products, the existing vent pipe is probably oversized for the single water heater or other appliance. The vent should be checked for proper draw with the remaining appliance.

Figure 14

1. In areas where piping penetrates joists or interior walls, hole must be large enough to allow clearance on all sides of pipe through center of hole using a hanger.
2. When furnace is installed in a residence where unit is shut down for an extended period of time, such as a vacation home, make provisions for draining condensate collection trap and lines.

Exhaust Piping (Figure 16)

3. Route piping to outside of structure. Continue with installation following instructions given in piping termination section.

⚠ CAUTION

Do not discharge exhaust into an existing stack or stack that also serves another gas appliance. If vertical discharge through an existing unused stack is required, insert PVC pipe inside the stack until the end is even with the top or outlet end of the metal stack.

⚠ CAUTION

The exhaust vent pipe operates under positive pressure and must be completely sealed to prevent leakage of combustion products into the living space.

Vent Piping Guidelines

This furnace is installed only as a Direct Vent gas central furnace.

NOTE: *In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged outdoors.*

Intake and exhaust pipe sizing — Size pipe according to Tables 6 and 7. Table 6 lists the *minimum* vent pipe lengths permitted. Table 7 lists the *maximum* pipe lengths permitted.

Regardless of the diameter of pipe used, the standard roof and wall terminations described in section *Exhaust Piping Terminations* should be used. Exhaust vent termination pipe is sized to optimize the velocity of the exhaust gas as it exits the termination. Refer to Table 8.

In some applications which permit the use of several different sizes of vent pipe, a combination vent pipe may be used. Contact Allied Air Technical Service Department for assistance in sizing vent pipe in these applications.

Minimum Vent Pipe Lengths

MODEL	MIN. EQUIV. VENT LENGTH	EXAMPLE
070, 090	15 ft.*	5 ft. plus 2 elbows of 2", 2-1/2", 3" diameter pipe
110**		5 ft. plus 2 elbows of 2-1/2" 3" diameter pipe

** Any approved termination may be added to the minimum equivalent length listed.*

Table 6

NOTE: *The exhaust collar on all models is sized to accommodate 2" Schedule 40 vent pipe. Contact the Technical Services Department for more information concerning sizing of vent systems which include multiple pipe sizes.*

NOTE: *All horizontal runs of exhaust pipe must slope back toward unit. A minimum of 1/4" (6 mm) drop for each 12" (305 mm) of horizontal run is mandatory for drainage.*

NOTE: *Exhaust pipe MUST be glued to furnace exhaust fittings.*

NOTE: *Exhaust piping should be checked carefully to make sure there are no sags or low spots.*

Use the following steps to correctly size vent pipe diameter.

⚠ CAUTION

Do not use screens or perforated metal in exhaust or intake terminations. Doing so will cause freeze ups and may block the terminations.

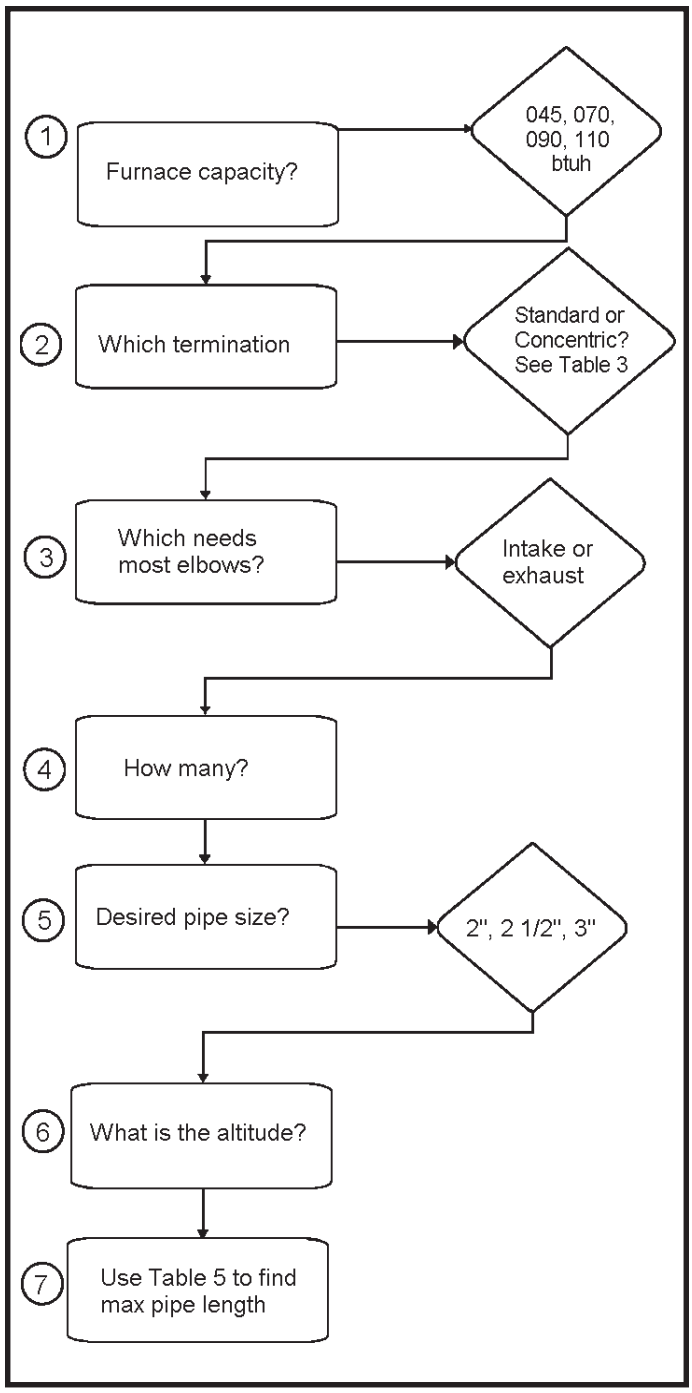


Figure 15

MAXIMUM ALLOWABLE VENT LENGTH

Standard Termination at Elevation 0' - 4500'										
Number of 90° Elbows	Pipe Size	2"			2-1/2"			3"		
	Model	070	090	110	070	090	110	070	090	110
	1	86	64		135	88	38	157	138	113
	2	81	59		130	83	33	152	133	108
	3	76	54		125	78	28	147	128	103
	4	71	49		120	73	23	142	123	98
	5	66	44	n/a	115	68	18	137	118	93
	6	61	39		110	63	13	132	113	88
	7	56	34		105	58	8	127	108	83
	8	51	29		100	53		122	103	78
	9	46	24		95	48	n/a	117	98	73
	10	41	19		90	43		112	93	68
Standard Termination Elevation 4501' - 7500'										
Number of 90° Elbows	Pipe Size	2"			2-1/2"			3"		
	Model	070	090	110	070	090	110	070	090	110
	1	61	64		110	88	38	132	138	113
	2	56	59		105	83	33	127	133	108
	3	51	54		100	78	28	122	128	103
	4	46	49		95	73	23	117	123	98
	5	41	44	n/a	90	68	18	112	118	93
	6	36	39		85	63	13	107	113	88
	7	31	34		80	58	8	102	108	83
	8	26	29		75	53		97	103	78
	9	21	24		70	48	n/a	92	98	73
	10	16	19		65	43		87	93	68
Concentric Termination Elevation 0' - 4500'										
Number of 90° Elbows	Pipe Size	2"			2-1/2"			3"		
	Model	070	090	110	070	090	110	070	090	110
	1	78	62		125	84	34	141	134	109
	2	73	57		120	79	29	136	129	104
	3	68	52		115	74	24	131	124	99
	4	63	47		110	69	19	126	119	94
	5	58	42	n/a	105	64	14	121	114	89
	6	53	37		100	59	9	116	109	84
	7	48	32		95	54		111	104	79
	8	43	27		90	49	n/a	106	99	74
	9	38	22		85	44		101	94	69
	10	33	17		80	39		96	89	64
Concentric Termination Elevation 4501' - 7500'										
Number of 90° Elbows	Pipe Size	2"			2-1/2"			3"		
	Model	070	090	110	070	090	110	070	090	110
	1	53	62		100	84	34	116	109	109
	2	48	57		95	79	29	111	104	104
	3	43	52		90	74	24	106	99	99
	4	38	47		85	69	19	101	94	94
	5	33	42	n/a	80	64	14	96	89	89
	6	28	37		75	59	9	91	84	84
	7	23	32		70	54		86	79	79
	8	18	27		65	49	n/a	81	74	74
	9	13	22		60	44		76	69	69
	10	8	17		55	39		71	64	64

Table 7

TYPICAL EXHAUST PIPE CONNECTIONS AND CONDENSATE TRAP INSTALLATION

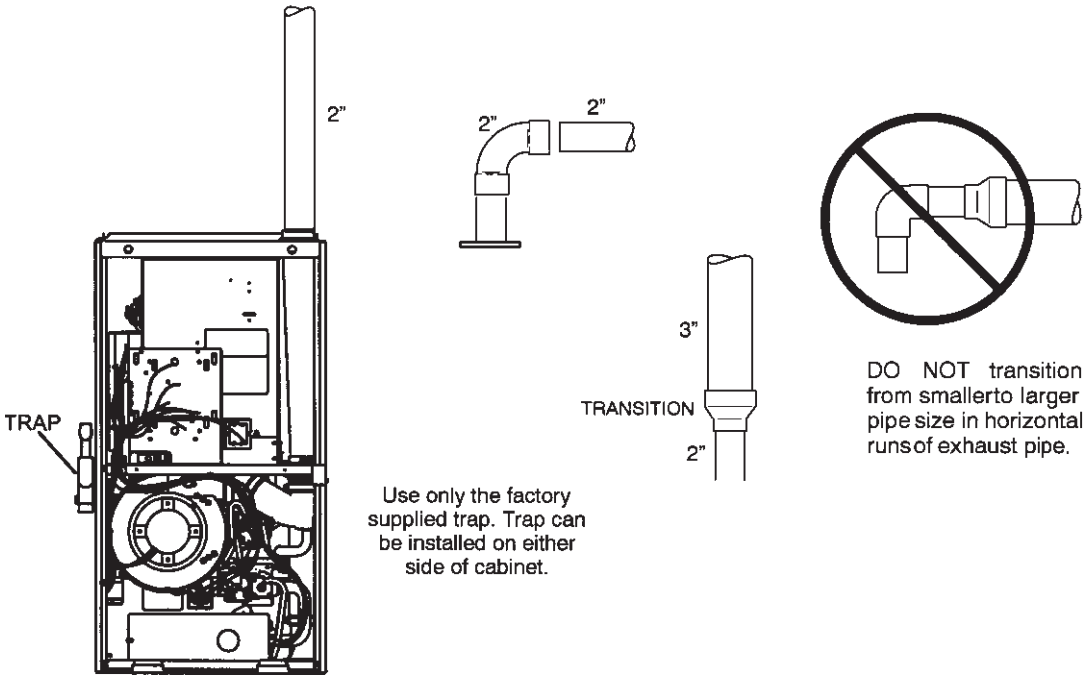


Figure 16

TYPICAL AIR INTAKE PIPE CONNECTIONS

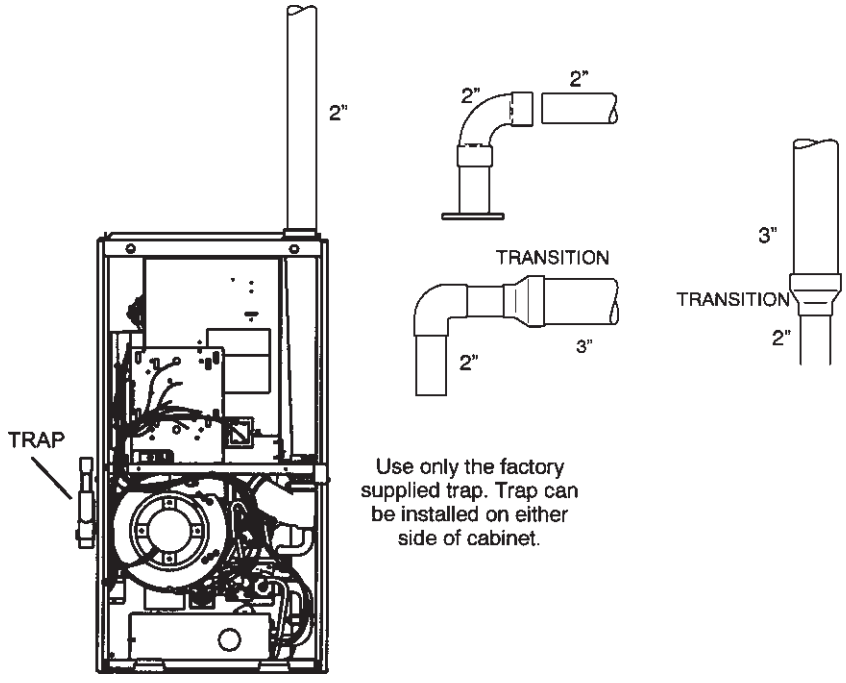
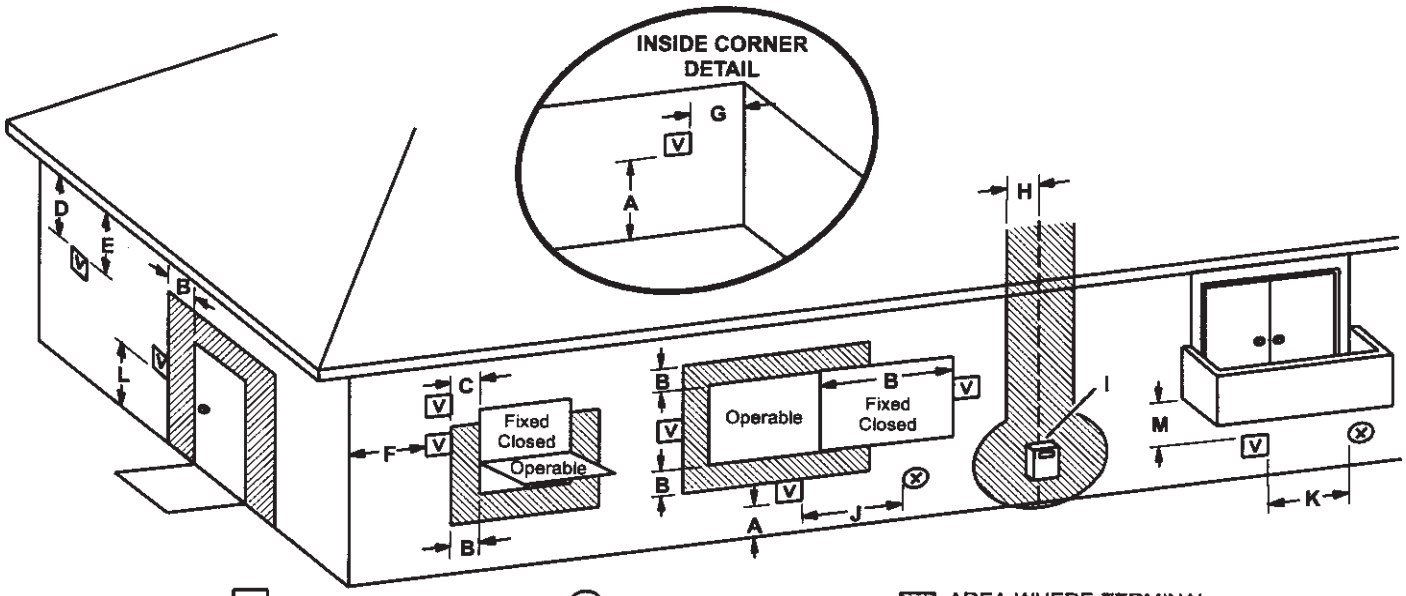


Figure 17

VENT TERMINATION CLEARANCES
FOR DIRECT VENT INSTALLATIONS IN THE USA AND CANADA



V VENT TERMINAL ⊗ AIR SUPPLY INLET AREA WHERE TERMINAL IS NOT PERMITTED

		US Installations[1]	Canadian Installations[2]
A =	Clearance above grade, veranda, porch, deck or balcony	12 inches (305mm) or 12 in. 305mm) above average snow accumulation.	12 inches (305mm) or 12 in. 305mm) above average snow accumulation.
B =	Clearance to window or door that may be opened	6 inches (152mm) for appliances <10,000 Btuh (3kw), 9 inches (mm) for appliances > 10,000 Btuh (3kw) and <50,000 Btuh (15 kw), 12 inches (305mm) for appliances > 50,000 Btuh (15kw)	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
C =	Clearance to permanently closed window	* 12"	* 12"
D =	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (mm) from the center line of the terminal	* Equal to or greater than soffit depth	* Equal to or greater than soffit depth
E =	Clearance to unventilated soffit	* Equal to or greater than soffit depth	* Equal to or greater than soffit depth
F =	Clearance to outside corner	* No minimum to outside corner	* No minimum to outside corner
G =	Clearance to inside corner	* 3 feet (.9m)	* 3 feet (.9m)
H =	Clearance to each side of center line extended above meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly	3 feet (.9m) within a height 15 feet (4.5m) above the meter / regulator assembly
I =	Clearance to service regulator vent outlet	* 3 feet (.9m)	3 feet (.9m)
J =	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (152mm) for appliances <10,000 Btuh (3kw), 9 inches (mm) for appliances > 10,000 Btuh (3kw) and <50,000 Btuh (15 kw), 12 inches (305mm) for appliances > 50,000 Btuh (15kw)	6 inches (152mm) for appliances <10,000 Btuh (3kw), 12 inches (305mm) for appliances > 10,000 Btuh (3kw) and <100,000 Btuh (30kw), 36 inches (.9m) for appliances > 100,000 Btuh (30kw)
K =	Clearance to mechanical air supply inlet	3 feet (.9m) above if within 10 feet (3m) horizontally	6 feet (1.8m)
L =	Clearance above paved sidewalk or paved driveway located on public property	* 7 feet (2.1m)	7 feet (2.1m)†
M =	Clearance under veranda, porch, deck or balcony	*12 inches (305mm)‡	12 inches (305mm)‡

[1] In accordance with the current ANSI Z223.1/NFPA 54 Natural Fuel Gas Code

[2] In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code

† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

‡ Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor. Allied Air recommends avoiding this location if possible.

For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, clearance will be in accordance with local installation codes and the requirements of the gas supplier and these installation instructions.

Figure 18

Details of Intake and Exhaust Piping Terminations for Direct Vent Installations

NOTE: *In Direct Vent installations, combustion air is taken from outdoors and flue gases are discharged to outdoors.*

Intake and exhaust pipes may be routed either horizontally through and outside wall or vertically through the roof. In attic or closet installations, vertical termination through the roof is preferred. Figures 19 through 23 show typical terminations.

1. Exhaust and intake exits must be in same pressure zone. Do not exit one through the roof and one on the side. Also, do not exit the intake on one side and the exhaust on another side of the house or structure.
2. Intake and exhaust pipes should be placed as close together as possible at termination end (refer to illustrations). Maximum separation is 3" (76 mm) on roof terminations and 6" (152 mm) on sidewall terminations.
3. On roof terminations, the intake piping should terminate straight down using two 90° elbows (See Figure 19).
4. Exhaust piping must terminate straight out or up as shown. A reducer is required on the exhaust piping at the point where it exits the structure to improve the velocity of exhaust away from the intake piping. See Table 8.

NOTE: *Care must be taken to avoid recirculation of exhaust back into intake pipe.*

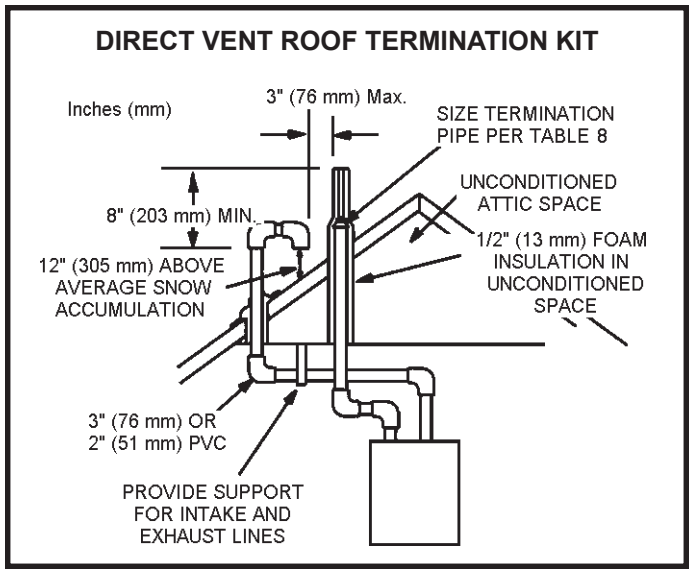
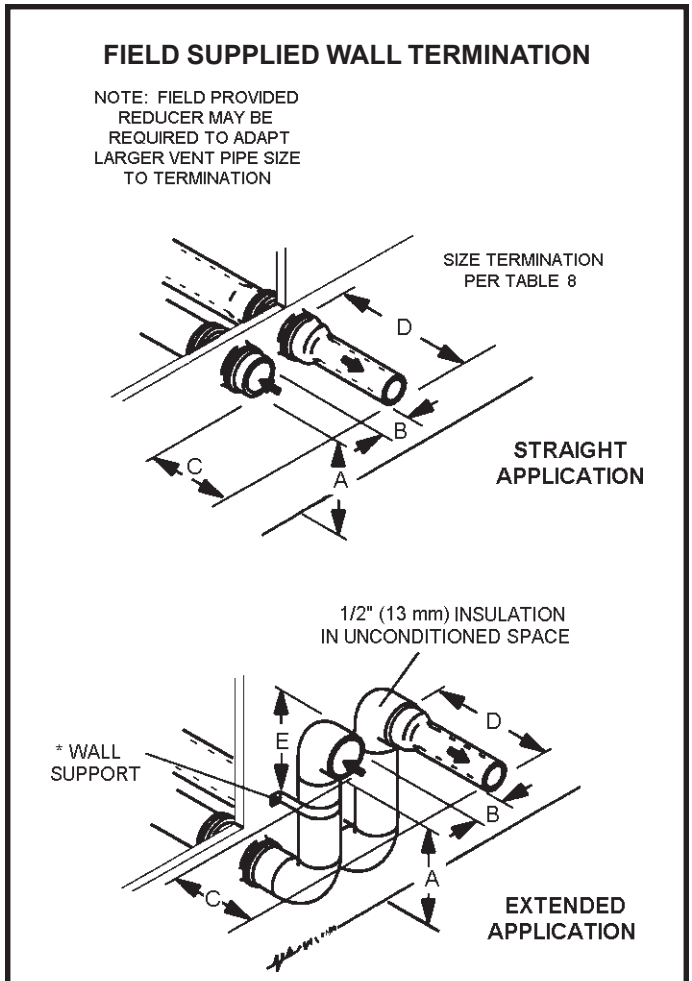


Figure 19



See venting Table 7 for maximum venting lengths with this arrangement.

* Use wall support every 24" (610 mm). Use two wall supports if extension is greater than 24" (610 mm) but less than 48" (1219 mm).

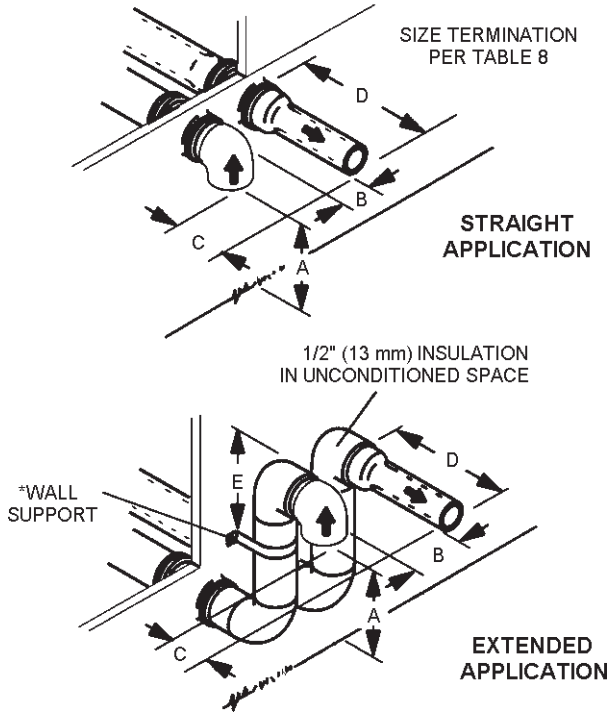
NOTE: *One wall support must be 6" (152 mm) from top of each pipe (intake and exhaust).*

	2" (51 mm) Vent Pipe	3" (76 mm) Vent Pipe
A-Minimum clearance above grade or average snow accumulation	12" (305 mm)	12" (305 mm)
B-Maximum horizontal separation between intake and exhaust	6" (152 mm)	6" (152 mm)
C-Minimum from end of exhaust to inlet of intake	8" (203 mm)	8" (203 mm)
D-Maximum exhaust pipe length	12" (305 mm)	20" (508 mm)
E-Maximum wall support distance from top of each pipe (intake/exhaust)	6" (152 mm)	6" (152 mm)

Figure 20

FIELD SUPPLIED WALL TERMINATION

NOTE: FIELD PROVIDED REDUCER MAY BE REQUIRED TO ADAPT LARGER VENT PIPE SIZE TO TERMINATION



See venting Table 7 for maximum venting lengths with this arrangement.

* Use wall support every 24" (610 mm). Use two wall supports if extension is greater than 24" (610 mm) but less than 48" (1219 mm).

NOTE: *One wall support must be 6" (152 mm) from top of each pipe (intake and exhaust).*

	2" (51 mm) Vent Pipe	3" (76 mm) Vent Pipe
A-Minimum clearance above grade or average snow accumulation	12" (305 mm)	12" (305 mm)
B-Maximum horizontal separation between intake and exhaust	6" (152 mm)	6" (152 mm)
C-Minimum from end of exhaust to inlet of intake	6" (152 mm)	6" (152 mm)
D-Maximum exhaust pipe length	12" (305 mm)	20" (508 mm)
E-Maximum wall support distance from top of each pipe (intake/exhaust)	6" (152 mm)	6" (152 mm)

Figure 21

EXHAUST PIPE TERMINATION SIZE REDUCTION

MODEL	Exhaust Pipe Size	Termination Pipe Size
070	2", 2-1/2" or 3"	1-1/2"
090	2", 2-1/2" or 3"	2"
110	2-1/2" or 3"	2"

Table 8

5. On field supplied terminations for sidewall exit, exhaust piping may extend a maximum of 12 inches (305 mm) for 2" PVC and 20 inches (508 mm) for 3" (76 mm) PVC beyond the outside wall. Intake piping should be as short as possible. See Figures 20 and 21.
6. On field supplied terminations, a minimum distance between the end of the exhaust pipe and the end of the intake pipe without a termination elbow is 8" and a minimum distance of 6" with a termination elbow. See Figures 20 and 21.
7. If intake and exhaust piping must be run up a side wall to position above snow accumulation or other obstructions, piping must be supported every 24" (610 mm) as shown in Figures 20 and 21. When exhaust and intake piping must be ran, size pipe per Table 8. The intake piping may be equipped with a 90° elbow turndown. Using turndown will add 5 feet (1.5 m) to the equivalent length of the pipe.

DIRECT VENT CONCENTRIC ROOFTOP TERMINATION

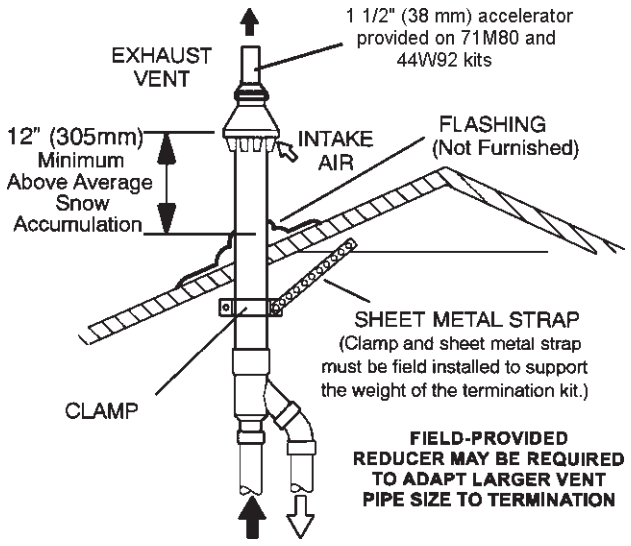
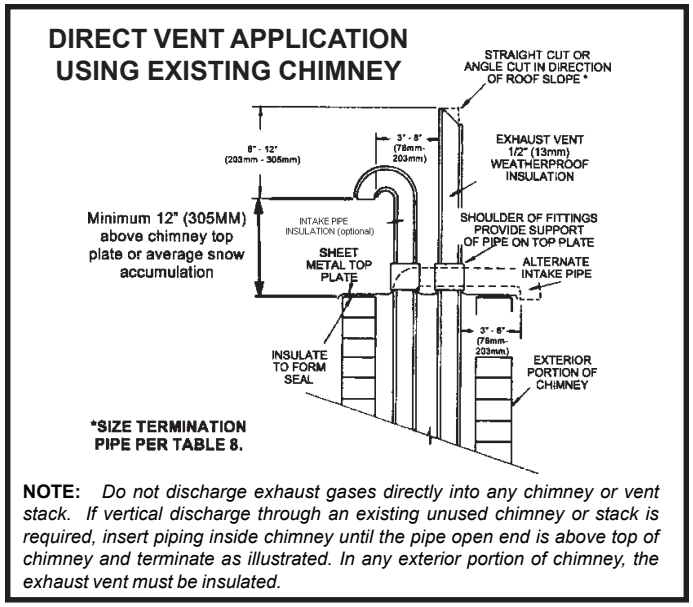


Figure 22



NOTE: *Do not discharge exhaust gases directly into any chimney or vent stack. If vertical discharge through an existing unused chimney or stack is required, insert piping inside chimney until the pipe open end is above top of chimney and terminate as illustrated. In any exterior portion of chimney, the exhaust vent must be insulated.*

Figure 23

Condensate Piping

This unit is designed for either right or left side exit of condensate piping. Refer to Figure 24 for condensate trap locations.

NOTE: *If necessary the condensate trap may be installed up* to 5 *feet away from the furnace. Piping from furnace must slope down* a *minimum of 1/4" per ft. toward trap.*

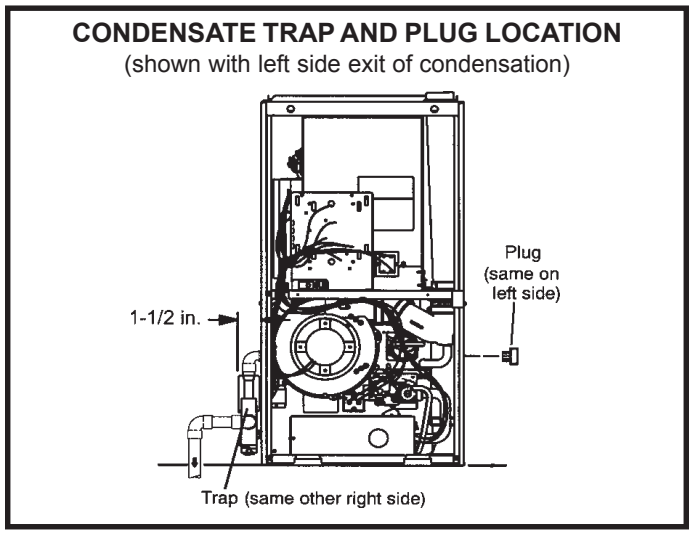


Figure 24

1. Determine which side condensate piping will exit the unit, location of trap, field provided fittings and length of PVC pipe required to reach available drain.
2. Remove plug (Figure 24) from the cold end header box at the appropriate location on the side of the unit. Install 1/2 NPT male field provided fitting into cold end header box. *Do Not Over Tighten.* Use teflon tape or appropriate pipe dope.
3. Install drain trap using appropriate PVC fittings, glue all joints. Glue the provided drain trap as shown in Figure 26. Route the condensate line to an open drain
3. Install drain trap using appropriate PVC fittings, glue all joints. Glue the provided drain trap as shown in Figure 26. Route the condensate line to an open drain.
4. If unit will be started immediately upon completion of installation, prime trap per procedure outlined in *Unit Start-Up* section.

Condensate line must be sloped downward away from condensate trap to drain. If drain level is above condensate trap, condensate pump must be used. Condensate drain line should be routed within the conditioned space to avoid freezing of condensate and blockage of drain line. If this is not possible, a heat cable kit may be used on the condensate trap and line.

⚠ CAUTION

Do not use copper tubing or existing copper condensate lines for drain line.

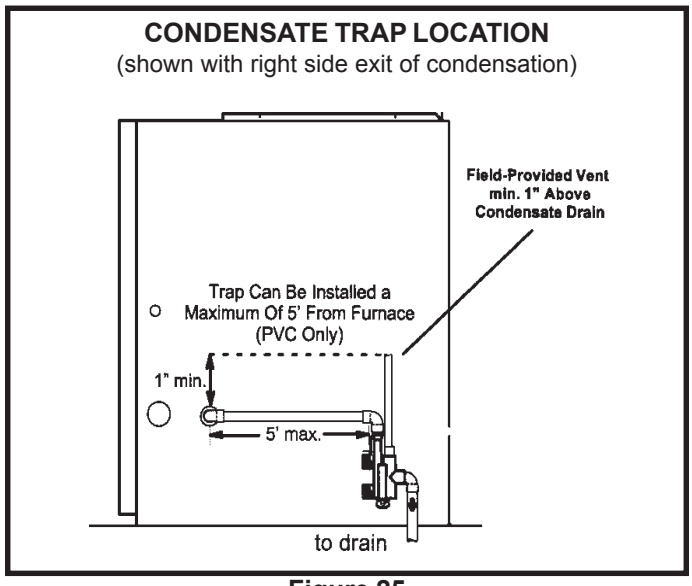


Figure 25

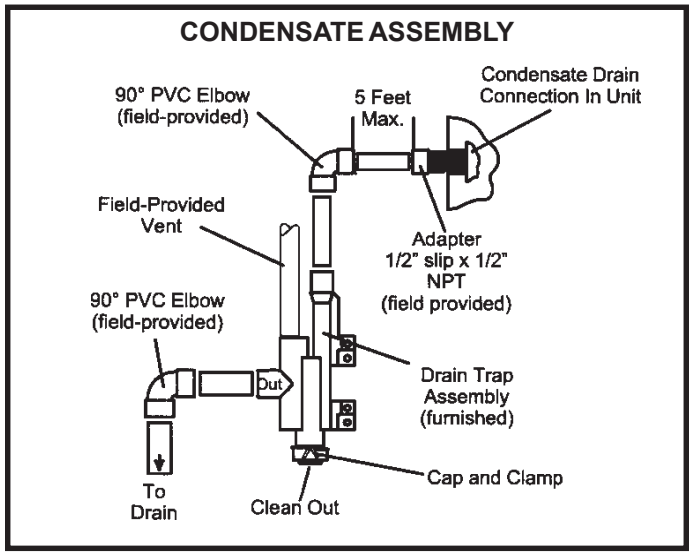


Figure 26

⚠ CAUTION

A separate drain line must be run to the drain from the condensate trap. **DO NOT** connect the condensate trap drain into the drain line from the evaporator coil.

UNIT WITH EVAPORATOR COIL

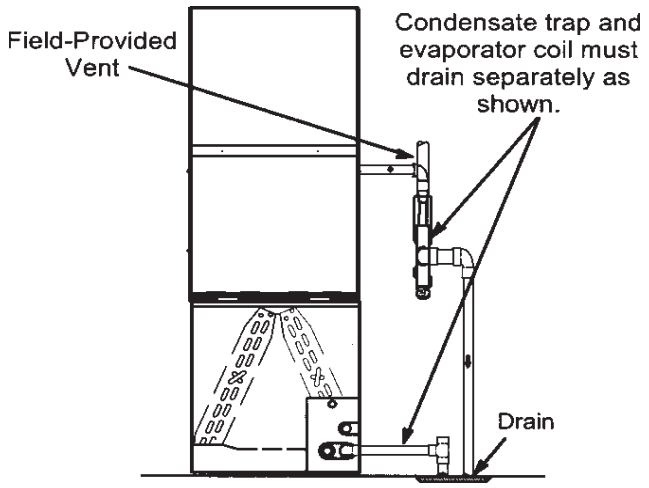


Figure 27

Gas Piping

⚠ CAUTION

If a flexible gas connector is required or allowed by the authority that has jurisdiction, black iron pipe shall be installed at the gas valve and extend outside the furnace cabinet.

⚠ WARNING

Do not exceed 600 in. lbs. (50 ft. lbs.) torque when attaching the gas piping to the gas valve.

1. Gas piping may be routed into the unit through either the left. or right hand side. Supply piping enters into the gas valve from the side of the valve as shown in Figure 29.
2. When connecting gas supply, factors such as length of run, number of fittings and furnace rating must be considered to avoid excessive pressure drop. Table 9 lists recommended pipe sizes for typical applications.

NOTE: *Use two wrenches when connecting gas piping to avoid transferring torque to the manifold.*

3. Gas piping must not run in or through air ducts, clothes chutes, chimneys or gas vents, dumb waiters or elevator shafts. Center gas line through piping hole. Gas line should not touch side of unit. See Figure 29.
4. Piping should be sloped 1/4 inch per 15 feet (6mm per 5.6m) upward toward the gas meter from the furnace. The piping must be supported at proper intervals, every 8 to 10 feet (2.44 to 3.05m), using suitable hangers or straps. Install a drip leg in vertical pipe runs to serve as a trap for sediment or condensate.
5. A 1/8" N.P.T. plugged tap or pressure post is located on the gas valve to facilitate test gauge connection. See Figures 35.
6. In some localities, codes may require installation of a manual main shut off valve and union (furnished by installer) external to the unit. Union must be of the ground joint type.

⚠ IMPORTANT

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

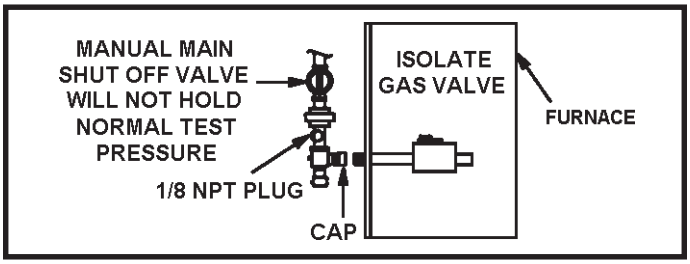


Figure 28

Leak Check

After gas piping is completed, carefully check all piping connections (factory and field installed) for gas leaks. Use a leak detecting solution or other preferred means.

The furnace must be isolated from the gas supply system by closing its individual manual shut off valve during any pressure testing of the gas supply system at pressures less than or equal to 1/2 *psig* (3.48 *kPa,* 14 *inches w.c.).*

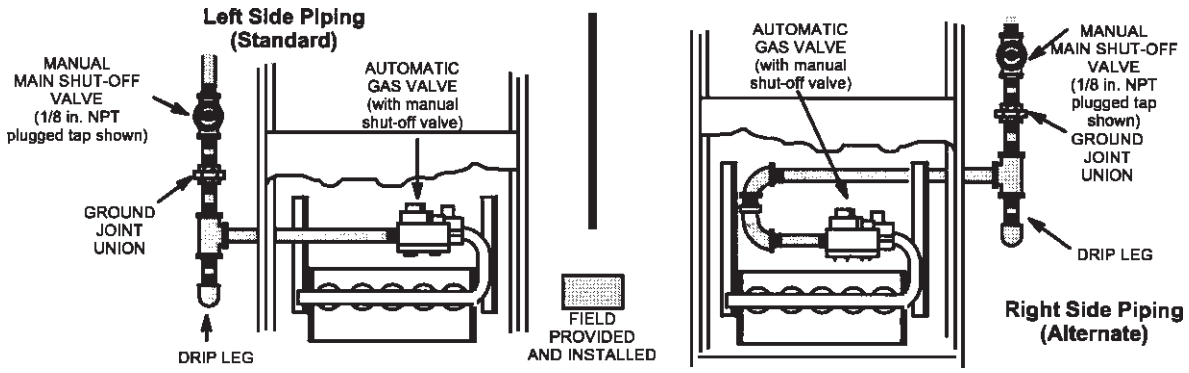
⚠ CAUTION

When testing gas lines using pressures in excess of 1/2 psig (3.48 kPa), gas valve must be disconnected and isolated. See Figure 28. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa).

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death, or property damage. Never use an open flame to test for gas leaks. Check all connections using a commercially available soap solution made specifically for leak detection. Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed.



NOTE: BLACK IRON PIPE **ONLY** TO BE ROUTED INSIDE OF CABINET

Figure 29

Removal of the Furnace from Common Vent

In the event that an existing furnace is removed from a venting system commonly run with separate gas appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.

Conduct the following test while each appliance is operating and the other appliances (which are not operating) remain connected to the common venting system. If the venting system has been installed improperly, you **must** correct the system as indicated in the general venting requirements section.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.

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

1. Seal any unused openings in the common venting system.
2. Inspect the venting system for proper size and horizontal pitch. Determine that there is no blockage, restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
3. Close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Follow the lighting instructions. Turn on the appliance that is being inspected. Adjust the thermostat so that the appliance operates continuously.
5. After the main burner has operated for 5 minutes, test for leaks of flue gases at the draft hood relief opening. Use the flame of a match or candle.
6. After determining that each appliance connected to the common venting system is venting properly, (step 3) return all doors, widows, exhaust fans, fireplace dampers, and any other gas burning appliances to their previous mode of operation.
7. If a venting problem is found during any of the preceding tests, the common venting system must be modified to correct the problem.

   Resize the common venting system to the minimum vent pipe size determined by using the appropriate tables in Appendix G. (These are in the current standards of the National Fuel Gas Code ANSI Z223.1.)

GAS PIPE CAPACITY - FT³/HR (kL/HR)

Nominal Iron Pipe Size -Inches(mm)	Internal Diameter -Inches(mm)	Length of Pipe-Feet(m)									
		10 (3.048)	20 (6.096)	30 (9.144)	40 (12.192)	50 (15.240)	60 (18.288)	70 (21.336)	80 (24.384)	90 (27.432)	100 (30.480)
1/2 (12.7)	.622 (17.799)	175 (4.96)	120 (3.40)	97 (2.75)	82 (2.32)	73 (2.07)	66 (1.87)	61 (1.73)	57 (1.61)	53 (1.50)	50 (1.42)
3/4 (19.05)	.824 (20.930)	360 (10.19)	250 (7.08)	200 (5.66)	170 (4.81)	151 (4.28)	138 (3.91)	125 (3.54)	118 (3.34)	110 (3.11)	103 (2.92)
1 (25.4)	1.049 (26.645)	680 (19.25)	465 (13.17)	375 (10.62)	320 (9.06)	285 (8.07)	260 (7.36)	240 (6.80)	220 (6.23)	205 (5.80)	195 (5.52)
1-1/4 (31.75)	1.380 (35.052)	1400 (39.64)	950 (26.90)	770 (21.80)	660 (18.69)	580 (16.42)	530 (15.01)	490 (13.87)	460 (13.03)	430 (12.18)	400 (11.33)
1-1/2 (38.1)	1.610 (40.894)	2100 (59.46)	460 (41.34)	1180 (33.41)	990 (28.03)	900 (25.48)	810 (22.94)	750 (21.24)	690 (19.54)	650 (18.41)	620 (17.56)
2 (50.8)	2.067 (52.502)	3950 (111.85)	2750 (77.87)	2200 (62.30)	1900 (53.80)	1680 (47.57)	1520 (43.04)	1400 (39.64)	1300 (36.81)	1220 (34.55)	1150 (32.56)
2-1/2 (63.5)	2.469 (67.713)	6300 (178.39)	4350 (123.17)	3520 (99.67)	3000 (84.95)	2650 (75.04)	2400 (67.96)	2250 (63.71)	2050 (58.05)	1950 (55.22)	1850 (52.38)
3 (76.2)	3.068 (77.927)	11000 (311.48)	7700 (218.03)	6250 (176.98)	5300 (150.07)	4750 (134.50)	4300 (121.76)	3900 (110.43)	3700 (104.77)	3450 (97.69)	3250 (92.03)
4 (101.6)	4.026 (102.260)	23000 (651.27)	15800 (447.39)	12800 (362.44)	10900 (308.64)	9700 (274.67)	8800 (249.18)	8100 (229.36)	7500 (212.37)	7200 (203.88)	6700 (189.72)

NOTE - Capacity given in cubic feet of gas per hour (kilo liters of gas per hour) and based on 0.60 specific gravity gas.

Table 9

Electrical

ELECTROSTATIC DISCHARGE (ESD)

Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and service to protect the furnace's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the furnace, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

INTERIOR MAKE-UP BOX

(FACTORY INSTALLED LEFT SIDE)

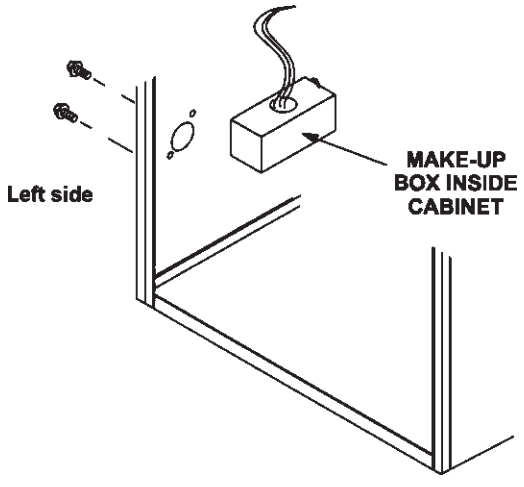


Figure 30

EXTERIOR MAKE-UP BOX

(FIELD INSTALLED RIGHT SIDE)

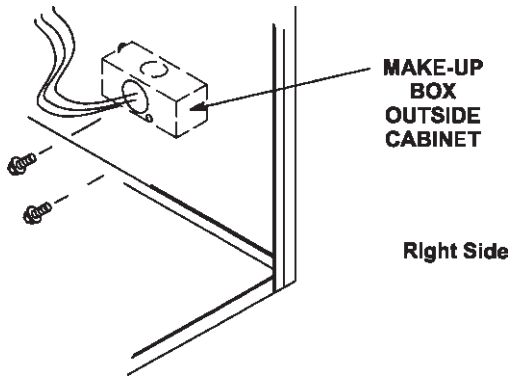


Figure 31

The unit is equipped with a field make-up box on the left hand side of the cabinet. The make-up box may be moved to the right side of the furnace to facilitate installation. If the make-up box is moved to the right side, clip the wire ties that bundle the wires together and install on the *outside* of the cabinet . See Figure 31. The excess wire must be pulled into the blower compartment. Secure the excess wire to the existing harness to protect it from damage.

Refer to Figure 32 for unit field wiring. Tables 13 through 19 shows DIP switch and on-board link settings for non-communicating thermostat applications. Typical wiring schematic is shown in Figure 33.

1. The power supply wiring must meet Class I restrictions. Protected by either a fuse or circuit breaker, select circuit protection and wire size according to unit nameplate.

NOTE: *Unit nameplate states maximum current draw. See table for maximum over current protection.*

Model	Maximum Over Current Protection (Amps)
07012B, 09012C, 09016C	15
09020C, 11020C	20

Table 10

2. Holes are on both sides of the furnace cabinet to facilitate wiring.
3. Install a separate (properly sized) disconnect switch near the furnace so that power can. be turned off for servicing.
4. Before connecting the thermostat or the power wiring, check to make sure the wires will be long enough for servicing at a later date. Remove the blower access panel to check the length of the wire.
5. Complete the wiring connections to the equipment. Use the provided unit wiring diagram and the field wiring diagram shown in Figure 32. Use 18 gauge wire or larger that is suitable for Class II rating for thermostat connections.
6. Electrically ground the unit according to local codes or, in the absence of local codes, according to the current National Electric Code (ANSI/NFPA No. 70) for the USA and current Canadian Electric Code part 1 (CSA standard C22.1) for Canada. A green ground wire is provided in the field make-up box.
7. One line voltage "EAC" *1/4"* spade terminal is provided on the furnace integrated control. Any electronic air cleaner rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. See Figure 34 for location of terminal. This terminal is energized when the indoor blower is operating.
8. One line voltage "HUM" *1/4"* spade terminal is provided on the furnace integrated control. Any humidifier rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. See Figure 34 for location of terminal. This terminal is energized in the heating mode when the indoor blower is is operating.
9. One 24V "H" terminal is provided on the furnace integrated control terminal block. Any humidifier rated up to 0.5 amp can be connected to this terminal with the ground leg of the circuit being connected to either ground or the "C" terminal. See figure 34 for location of terminal.
10. Install the room thermostat according to the instructions provided with the thermostat. See Table 11 for thermostat connections. If the furnace is being matched with a heat pump, refer to the instruction packaged with the dual fuel thermostat.

Thermostat Selection

The unit is designed to operate in a variable rate capacity mode using a two stage thermostat. This unit will automatically adjust firing rate based upon thermostat cycle times.

For optimal performance in non-communicating applications, Allied Air recommends the following two stage thermostat set-up for optimal variable rate capacity mode:

First heat stage differential set to *1/2* to 1 degree F; second heat stage differential set to *1/2* or 1 degree F; second heat stage upstage timer disabled, or set to maximum (1 hr minimum).

Indoor Blower Speeds

1. When the thermostat is set to "FAN ON," the indoor blower will run continuously at 38% percent of the second stage cooling speed when there is no cooling or heating demand.
2. When the unit is running in the heating mode, the integrated control will automatically adjust the blower speed to match the furnace firing rate. This speed can be adjusted up or down by 7.5% or 15% using DIP switches 14 through 16 for the low heat speed and 17 through 19 for the high heat speed.
3. When there is a cooling demand, the indoor blower will run on the cooling speed designated by the positions of DIP switches 8 through 11.

Generator Use - Voltage Requirements

The following requirements must be kept in mind when specifying a generator for use with this equipment:

- The furnace requires 120 volts ± 10% (Range: 108 volts to 132 volts).
- The furnace operates at 60 Hz ± 5% (Range: 57 Hz to 63 Hz).
- The furnace integrated control requires both polarity and proper ground. Both polarity and proper grounding should be checked before attempting to operate the furnace on either permanent or temporary power.
- Generator should have a wave form distortion of less than 5% RHD.

TYPICAL FIELD WIRING DIAGRAM FOR STANDARD NON-COMMUNICATING THERMOSTAT

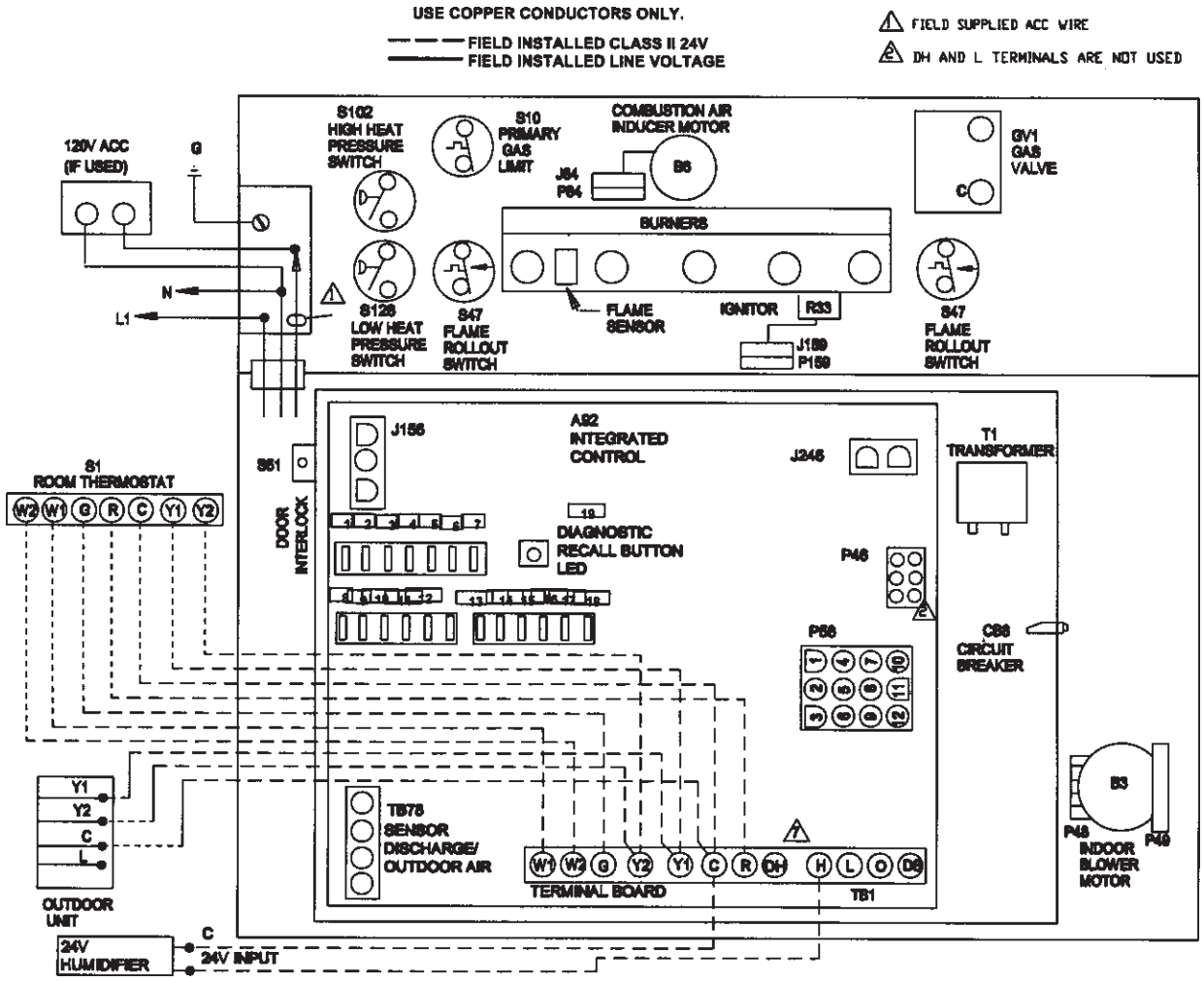
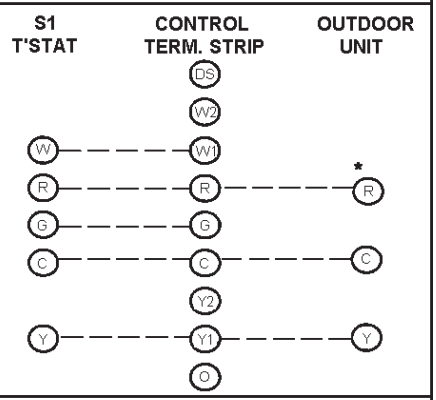
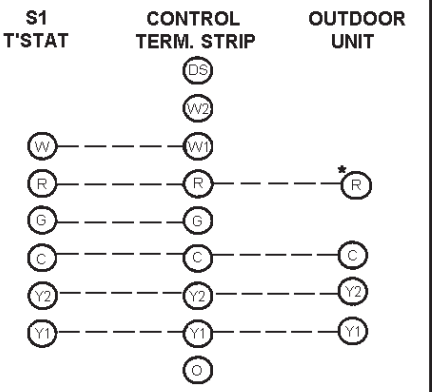
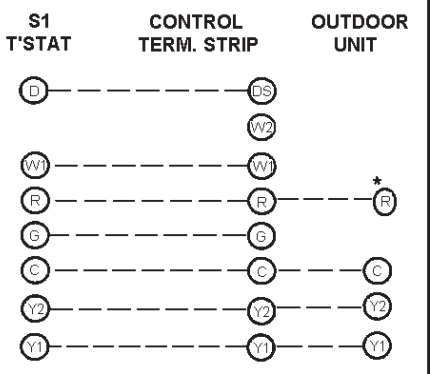


Figure 32

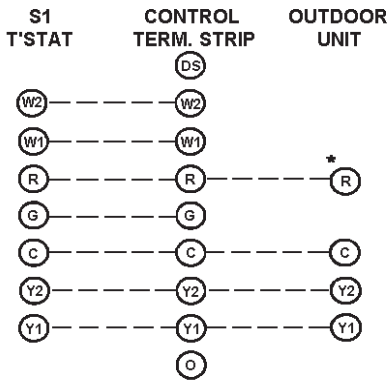
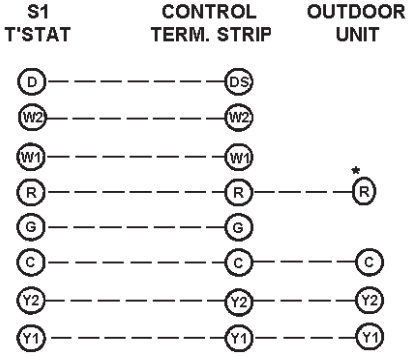
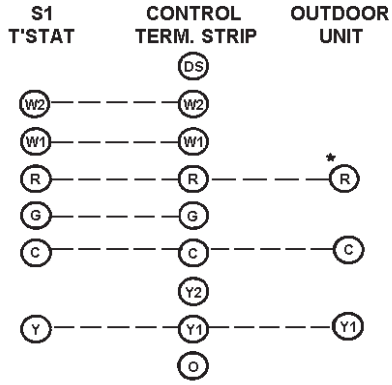
Field Wiring Connections for Non-Communicating Thermostat Applications

Thermostat	DIP Switch Settings and On Board Links (Figure 34)				Wiring Connections
	DIP Switch 1	W915 (Y1 to Y2) Two-Stage Cooling	W914 (DS to R) Dehumidification	W951 (O to R) Heat Pumps	
1 Heat / 1 Cool **NOTE** - Use DIP switch 3 to set second stage heat ON delay. OFF 7 minutes, ON 12 minutes.	ON	Intact	Intact	Intact	
1 Heat / 2 Cool **NOTE** - Use DIP switch 3 to set second stage heat ON delay. OFF 7 minutes, ON 12 minutes.	ON	Cut	Intact	Intact	
1 Heat / 2 Cool with t'stat with dehumidification mode **NOTE** - Use DIP switch 3 to set second stage heat ON delay. OFF 7 minutes, ON 12 minutes.	ON	Cut	Cut	Intact	

* "R" required on some units.

Table 11

Field Wiring Connections for Non-Communicating Thermostat Applications (Continued)

Thermostat	DIP Switch Settings and On Board Links (Figure 34)				Wiring Connections
	DIP Switch 1	W915 (Y1 to Y2) Two Stage Cooling	W914 (DS to R) Dehumidification	W915 (O to R) Heat Pumps	
2 Heat / 2 Cool	OFF	Cut	Intact	Intact	
2 Heat / 2 Cool with t'stat with dehumidification mode	OFF	Cut	Cut	Intact	
2 Heat / 1 Cool	OFF	Intact	Intact	Intact	

* "R" required on some units.

Table 11

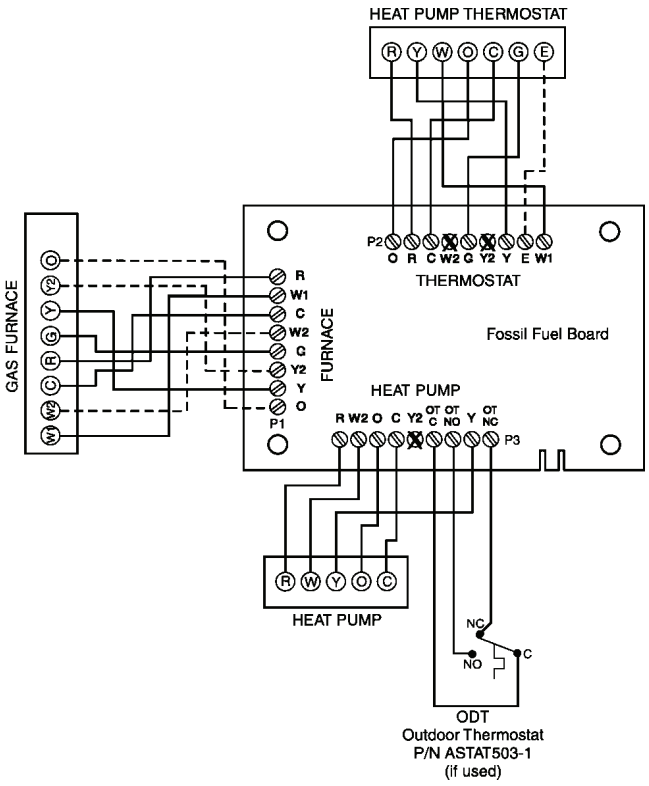
Low Voltage Field Wiring

Single Stage

Thermostat	DIP Switch Settings & On Board Links (Figure 34)			
	DIP Switch	W915 (Y1 to Y2) Two Stage Cooling	W914 (DS to R) Dehumidification	W951 (O to R) Heat Pumps
Dual Fuel Single Stage Heat Pump thermostat w/dual fuel capabilities Capable of 2 stage gas heat control	DIP Switch 1 OFF	Intact	Intact	Cut

2 Stage

Thermostat	DIP Switch Settings & On Board Links (Figure 34)			
	DIP Switch	W915 (Y1 to Y2) Two Stage Cooling	W914 (DS to R) Dehumidification	W951 (O to R) Heat Pumps
Dual Fuel Two Stage Heat Pump thermostat w/dual fuel capabilities Capable of 2 stage gas heat control	DIP Switch 1 OFF	Cut	Intact	Cut



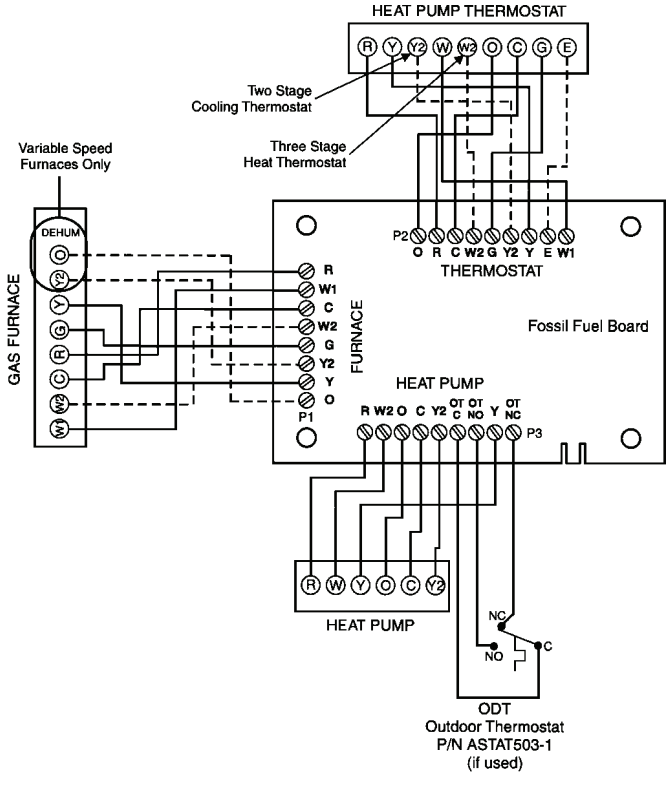


Table 11

TYPICAL WIRING DIAGRAM

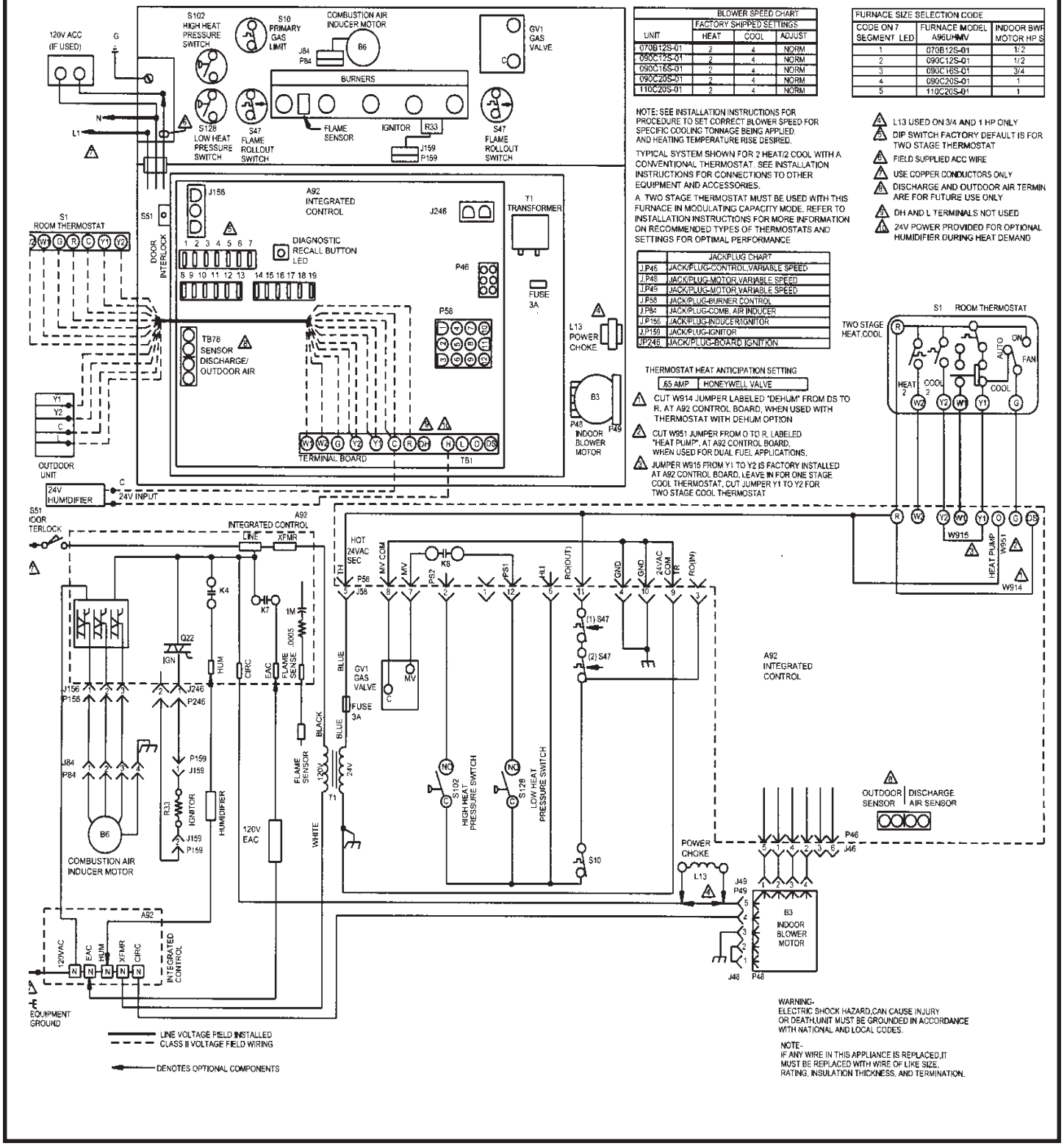
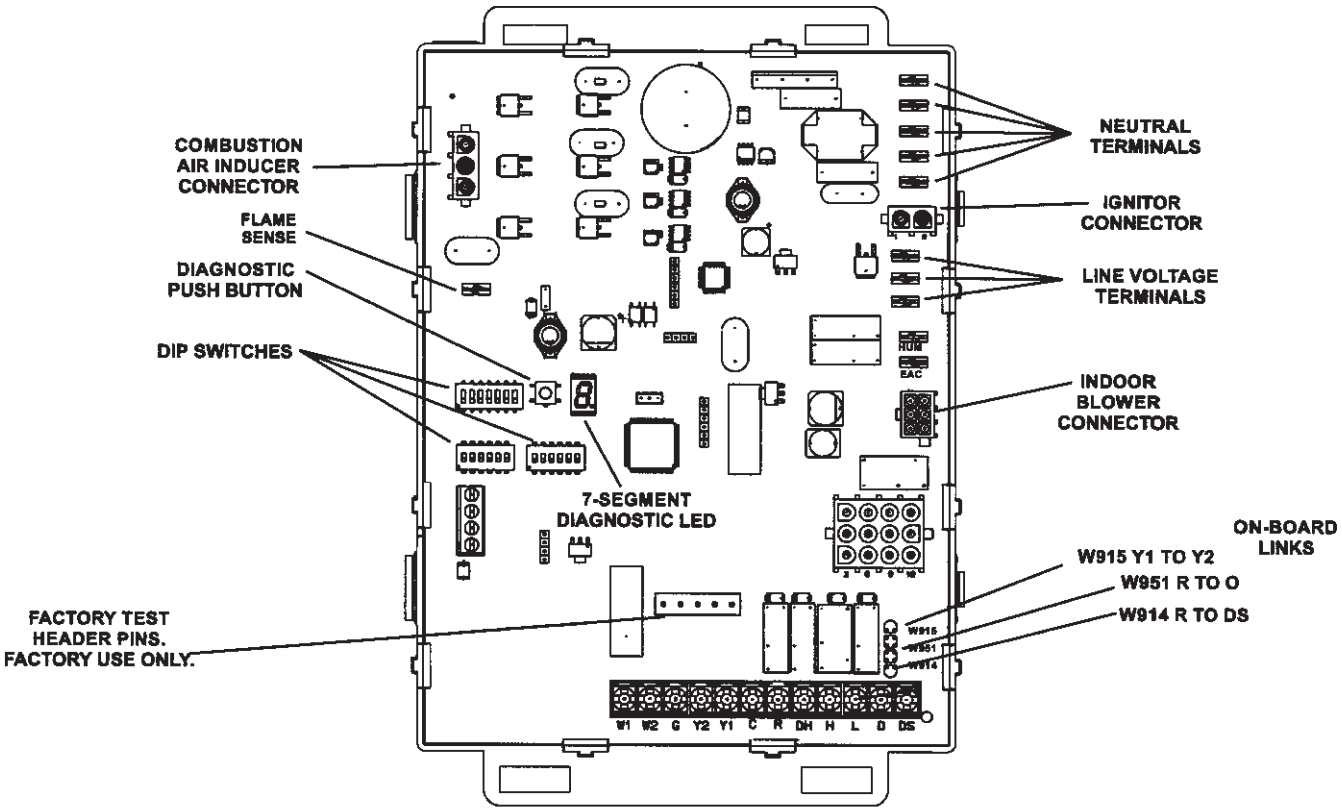


Figure 33

INTEGRATED CONTROL



1/4" QUICK CONNECT TERMINALS

HUM = 120 VAC OUTPUT TO HUMIDIFIER
XMFR = 120 VAC OUTPUT TO TRANSFORMER

LI = 120 VAC INPUT TO CONTROL

CIRC = 120 VAC OUTPUT TO CIRCULATING BLOWER

EAC = 120 VAC OUTPUT TO ELECTRICAL AIR CLEANER

NEUTRALS = 120 VAC NEUTRAL

THERMOSTAT CONNECTIONS (TB1)

DS = DEHUMIDIFICATION SIGNAL
W2 = HEAT DEMAND FROM 2ND STAGE T/STAT

W1 = HEAT DEMAND FROM 1ST STAGE T/STAT

R = CLASS 2 VOLTAGE TO THERMOSTAT

G = MANUAL FAN FROM T'STAT

C = THERMOSTAT SIGNAL GROUND CONNECTED TO TRANSFORMER GRD (TR) & CHASIS GROUND (GRD)

Y1 = THERMOSTAT 1ST STAGE COOL SIGNAL

Y2 = THERMOSTAT 2ND STAGE COOL SIGNAL

O = THERMOSTAT SIGNAL TO HEAT PUMP REVERSING VALVE

H = 24V HUMIDIFIER OUTPUT.

L = NOT USED

DH = NOT USED

Figure 34

THERMOSTAT SELECTION SWITCH SETTINGS

Operation	Thermostat	Switch 1	Switch 2	Switch 3
Variable Capacity Heat (35% to 100%)	Two Stage	OFF	ON	OFF
Three Stage Heat (35%, 70%, 100%)	Single Stage	ON	OFF	2nd stage delay OFF = 7 minutes ON = 12 minutes 3rd stage delay 10 minutes fixed
Two Stage Heat (W1 70%, W2 100%)	Two Stage	OFF	OFF	OFF

Table 12

The units are equipped with an integrated control. This control manages ignition timing, combustion air inducer speed, heating mode fan off delays and indoor blower speeds based on selections made using the control DIP switches and on board links. The control includes an internal feature which automatically resets the ignition control when it has been locked out.

NOTE: *All DIP switches are factory shipped in the "OFF" position.*

Heating Operation DIP Switch Settings — Figure 34
Switch 1 — Thermostat Selection — This unit may be used with either a single stage or two stage thermostat. The thermostat selection is made using a DIP switch which must be properly positioned for the particular application. The DIP switch is factory positioned for use with a two stage thermostat. If a single stage thermostat is to be used, the DIP switch must be repositioned. See Table 12.

Switch 2 — Operating Mode with Two Stage Thermostat — If a two stage thermostat is used, the furnace can operate in either variable capacity or conventional two stage mode. When variable capacity mode is selected, the firing rate of the unit is varied to maximize comfort. Conventional two stage mode is the factory default setting. See Table 12.

Switch 3 — Second-Stage Heat On Delay — If a single stage thermostat is used, the integrated control can be used to energize second stage heat after either 7 minutes or 12 minutes of first stage heat operation. See Table 12.

Switches 4 and 5 — Blower-Off Delay — The blower ON delay of 45 seconds is not adjustable. The blower OFF delay (time that the blower operates after the heating demand has been satisfied) can be adjusted by moving switches 4 and 5 on the integrated control. The unit is shipped from the factory with a blower OFF delay of 90 seconds.

The blower OFF delay affects comfort and is adjustable to satisfy individual applications. Adjust the blower OFF delay to achieve a supply air temperature between 90° and 110°F at the exact moment that the blower is de-energized. Longer OFF delay settings provide lower supply air temperatures; shorter settings provide higher supply air temperatures. Table 13 provides the blower OFF timings that will result from different switch settings.

Blower OFF Delay Switch Settings

Blower Off Delay (Seconds)	Switch 4	Switch 5
60	Off	On
90 (factory)	Off	Off
120	On	Off
180	On	On

Table 13

Indoor Blower Operation DIP Switch Settings
Switches 6 and 7 — Continuous Indoor Fan Operation Blower Speed — The unit is shipped from the factory with the DIP switches positioned for medium low (38%) speed during continuous indoor blower operation. Continuous fan setting is 38% of cool setting and is not adjustable.

Switches 8 and 9 - Cooling Mode Blower Speed-
The unit is shipped from the factory with the DIP switches positioned for high speed (4) indoor blower motor operation during the cooling mode. The table below provides the cooling mode blower speeds that will result from different switch settings.

Cooling Mode Blower Speeds

Speed	Switch 8	Switch 9
1 - Low	On	On
2 - Medium Low	Off	On
3 - Medium High	On	Off
4 - High (Factory)	Off	Off

Table 14

Switches 10 and 11 - Cooling Mode Blower Speed Adjustment - The unit is shipped from the factory with the DIP switches positioned for NORMAL (no) adjustment. The DIP switches may be positioned to adjust the blower speed by +10% or -10% to better suit the application. Table 15 provides blower speed adjustments that will result from different switch settings. Refer to air flow tables for values.

With switches 10 an 11 set to ON, motor will bypass ramping profiles and all delays and will immediately run at selected COOLING speed upon a call for cool. LED will continue to operate as normal. This mode is used to check motor operation.

Cooling Mode Blower Speed Adjustment

Adjustment	Switch 10	Switch 11
+ 10% (approx.)	On	Off
NORMAL (Factory)	Off	Off
- 10% (approx.)	Off	On
MOTOR TEST	On	On

Table 15

Switches 12 and 13 - Cooling Mode Blower Speed Ramping - Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on blower motor performance. Table 16 provides the cooling mode blower speed ramping options that will result from different switch settings. The cooling mode blower speed ramping options are detailed below.

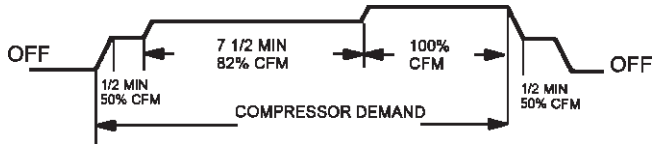
NOTE: *The OFF portion of the selected ramp profile only applies during heat pump operation in dual fuel applications.*

Cooling Mode Blower Speed Ramping

Ramping Option	Switch 12	Switch 13
A (Factory)	Off	Off
B	On	Off
C	Off	On
D	On	On

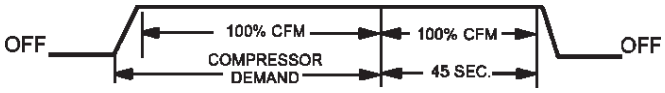
Table 16

Ramping Option "A" (Factory Selection)
- Motor runs at 50% for 30 seconds.
- Motor then runs at 82% for approximately 7-1/2 minutes.
- If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 50% for 30 seconds then ramps down to stop.

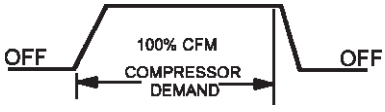


Ramping Option "B"
- Motor runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.

Ramping Option "C"
- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 45 seconds then ramps down to stop.



Ramping Option "D"
- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.



Switches 14 through 19 - Heating Mode Blower Speed
These switches are factory set at the OFF position which provides 100% of normal speed during HIGH HEAT demand, 70% of normal speed during MIDRANGE HEAT demand and 40% of normal speed during LOW HEAT demand. Switches 14, 15 and 16 are used to adjust the LOW HEAT blower motor speed. Switches 17, 18 and 19 are used to adjust the HIGH HEAT blower motor speed. Table 17 provides the heating mode blower speeds that will result from different switch settings.

Low Heat Blower Speeds

Thermostat Demand	Blower Speed Adjustments	DIP SWITCH SETTINGS		
		14	15	16
Low Heat (R to W1)	+ 15%	On	Off	On
	+7.5%	On	Off	Off
	Normal	Off	Off	Off
	-7.5%	On	On	Off
	-15%	On	On	On

Table 17

High Heat Blower Speeds

Thermostat Demand	Blower Speed Adjustments	DIP SWITCH SETTINGS		
		17	18	19
High Heat (R to W1 & W2)	+15%	On	Off	On
	+7.5%	On	Off	Off
	Normal	Off	Off	Off
	-7.5%	On	On	Off
	-15%	On	On	On

Table 18

On Board Links
On Board links must be clipped (when applicable) before unit is placed into operation with a non-communicating thermostat.

On Board Link W914 DS to R (Figure 34) On Board link W914, is a clippable connection between terminals DS and R on the integrated control. W914 must be cut when installed with a thermostat which features humidity control. Refer to Table 19 for operation sequence in applications for this unit, a thermostat which features humidity control and a single speed outdoor unit. Table 20 gives the operation sequence in applications with a two speed outdoor unit.

On Board Link W951 R to O (Figure 34)
On Board link W951 is a clippable connection between terminals R and O on the integrated control. W951 must be cut when the furnace is installed in applications which include a heat pump unit and thermostat which features dual fuel use. If the link is left intact, terminal "O" will remain energized eliminating the HEAT MODE in the heat pump.

On Board Link W915 Y1 to Y2 (Figure 34)
On Board linkW915 si a clippable connection between terminals Y1 and Y2 on the integrated control. W915 must be cut if two stage cooling will be used. If the link is not cut the outdoor unit will operate in second stage cooling only.

Diagnostic LED (Figure 34)
The seven segment diagnostic LED displays operating status, target airflow, error codes and other information. The table on page 43 lists diagnostic LED codes.

Diagnostic Push Button (Figure 34)
The diagnostic push button is located adjacent to the seven segment diagnostic LED. This button is used to enable the Error Code Recall mode and the Field Test mode. Press the button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed. When the button is released, the displayed item will be selected. Once all items in the menu have been displayed, the menu resumes from the beginning until the button is released.

Error Code Recall Mode
Select "E: from the menu to access the most recent 10 error codes. Select "c" from the Error Code Recall menu to clear all error codes. Button must be pressed a second time while "c" is flashing to confirm command to delete codes. Press the button until a solid "-" is displayed to exit the Error Code Recall mode.

Field Test Mode
Use the diagnostic push button to scroll through the menu as described above. Release the button when the LED flashes "-" to select the Field Test mode.

While in the Field Test mode the technician can:

- Initiate furnace ignition and move to and hold low-fire rate by applying a R to W1 jumper.
- Initiate furnace ignition sequence and move to an hold high-fire rate by applying a jumper from R to W1 and W2.
- Initiate furnace ignition sequence and move to and hold mid-fire rate by applying a jumper to R and W2.
- Apply then remove the jumper from R to W1 and W2 to change the firing rate from low fire to mid fire and high fire.
- A vent calibration sequence can be initiated even if a thermostat signal is not present. Press and hold the push button until a solid "C" is displayed. Release the button and calibration will begin. The furnace will perform the high-fire and low-fire pressure switch calibrations and display "CAL". After calibration , the LED will return to the flashing "-" display.

During Field Test mode operation, all safety switches are still in the circuit (they are not by-passed) and indoor blower performance and timings will match DIP switch selections. Current furnace firing rate, indoor blower CFM and flame signal will be displayed. To exit the Field Test mode, press and hold the button. The menu will resume from the beginning. Also, cycle the main power to exit the Field Test mode. The integrated control will automatically exit the Field Test mode after 45 minutes of operation

COOLING OPERATING SEQUENCE
A96DFMV and Single Stage Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND					SYSTEM RESPONSE		
System Condition	Step	Demand			Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		1st stage	O	G	Status	D			
NO CALL FOR DEHUMIDIFICATION									
Normal Operation	1	On	On	On	Acceptable	24 VAC	High	100%	Compressor and indoor blower follow thermostat demand
STANDARD MODE (only active on a Y1 thermostat demand)									
Normal Operation	1	On	On	On	Acceptable	24 VAC	High	100%	Thermostat energizes Y1 and de-energizes D on a call for de-humidification
Dehumidification Call*	2	On	On	On	Demand	0 VAC	High	70%	
PRECISION MODE (operates independent of a Y! thermostat demand)									
	On-board links at indoor unit with a single-stage outdoor unit: With Condensing unit - Cut W914 (R to DS) on control; With Heat Pump - Cut W914 (R to DS) & W951 (R to O)on control.								

* Thermostats with dehumidification function.

Table 19

COOLING OPERATING SEQUENCE
A96DFMV and Two Stage Outdoor Unit

OPERATING SEQUENCE		SYSTEM DEMAND						SYSTEM RESPONSE		
System Condition	Step	Demand				Relative Humidity		Compressor	Blower CFM (COOL)	Comments
		1st stage	2nd stage	O	G	Status	D*			
NO CALL FOR DEHUMIDIFICATION										
Normal Operation - Y1	1	On		On	On	Acceptable	24 VAC	Low	70%	Compressor and indoor blower follow thermostat demand
Normal Operation - Y2	2	On	On	On	On	Acceptable	24 VAC	High	100%	
ROOM THERMOSTAT CALLS FOR FIRST STAGE COOLING										
BASIC MODE (only active on a Y1 thermostat demand)										
Normal Operation	1	On		On	On	Acceptable	24 VAC	Low	70%	Thermostat energizes 2nd stage and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On	On	Demand	0 VAC	High	70%	
PRECISION MODE (operates independent of a Y1 thermostat demand)										
Normal Operation	1	On		On	On	Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On	Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On	On	On	On	Demand	0 VAC	High	70%	Thermostat will keep outdoor unit energized after cooling temperature setpoint has been reached in order to maintain room humidity setpoint.
ROOM THERMOSTAT CALLS FOR FIRST AND SECOND STAGE COOLING										
BASIC MODE (only active on a Y1 thermostat demand)										
Normal Operation	1	On	On	On	On	Acceptable	24 VAC	High	100%	Thermostat energizes 2nd stage and de-energizes D on a call for dehumidification
Dehumidification Call	2	On	On	On	On	Demand	0 VAC	High	70%	
PRECISION MODE (operates independent of a Y1 thermostat demand)										
Normal Operation	1	On		On	On	Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On	Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On	On	On	On	Demand	0 VAC	High	70%	Thermostat will keep outdoor unit energized after cooling temperature setpoint has been reached in order to maintain room humidity setpoint.
	On-board links at indoor unit with a two-stage outdoor unit: Cut factory link from Y1 to Y2 or cut W915 (Y1 to Y2) on integrated control. With Condensing unit - Cut W914 (R to DS) on integrated control; With Heat Pump - Cut W914 (R to DS) & W951 (R to O) on integrated control.									

Table 20

Unit Start Up

FOR YOUR SAFETY READ BEFORE OPERATING

⚠ WARNING

Do not use this furnace if any part has been underwater. A flood damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. Immediately call a qualified service technician to inspect the furnace and to replace all gas controls, control system parts, and electrical parts that have been wet or to replace the furnace, if deemed necessary.

⚠ WARNING

Danger of explosion. Can cause injury or product or property damage. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply.

⚠ CAUTION

Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch.

⚠ WARNING

During blower operation, the ECM motor emits energy that may interfere with pacemaker operation. Interference is reduced by both the sheet metal cabinet and distance.

Priming Condensate Trap

The condensate trap should be primed with water prior to startup to ensure proper condensate drainage. Either pour 10 fl. oz. (300 ml) of water into the trap, or follow these steps to prime the trap:

1. Follow the lighting instructions to place the unit into operation.
2. Set the thermostat to initiate a heating demand.
3. Allow the burners to fire for approximately 3 minutes.
4. Adjust the thermostate to deactivate the heating demand.
5. Wait for the combustion air inducer to stop. Set the thermostat to initiate a heating demand and again allow the burners to fire for approximately 3 minutes.
6. Ajust the thermostat to deactivate the heating demand and again wait for the combustion air inducer to stop. At this point, the trap should be primed with sufficient water to ensure proper condensate drain operation.

BEFORE PLACING THE UNIT INTO OPERATION

Smell all around the furnace area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

The gas valve on these units are equipped with a gas control switch. Use only your hand to move the control switch. Never use tools. If the switch will not move by hand, do not try to repair it. Force or attempted repair may result in a fire or explosion.

Placing the Furnace into Operation:

These units are equipped with an automatic ignition system. Do not attempt to manually light burners on this furnace. Each time the thermostat calls for heat, the burners will automatically light. The ignitor does not get hot when there is no call for heat on units with this ignition system.

⚠ WARNING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or death.

Gas Valve Operation (Figure 35)

1. **STOP!** Read the safety information at the beginning of this sectioin.
2. Set the thermostat to the lowest setting.
3. Turn **OFF** all electrical power to the unit.
4. This furnace is equipped with an ignition device which automatically lights the burners. **DO NOT** try to light the burners by hand.
5. Remove the access panel.
6. Move the gas valve switch to the **OFF** position. See Figure 35.
7. Wait five minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call the gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to the next step.
8. Move gas valve switch to the **ON** position. See Figure 35. **DO Not** force.

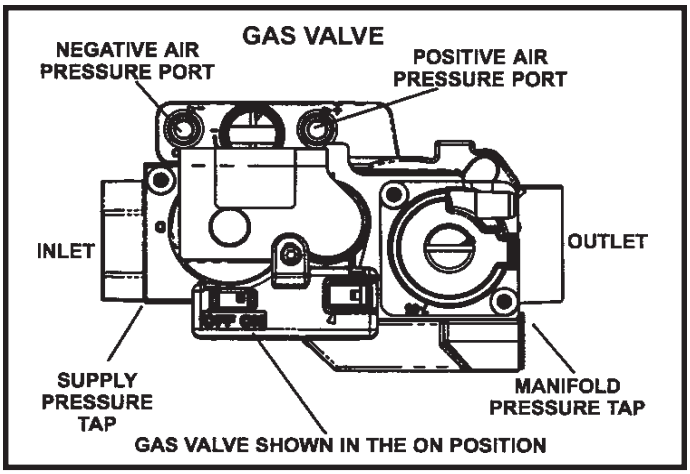


Figure 35

9. Replace the access panel.
10. Turn on all electrical power to the unit.
11. Set the thermostat to desired setting.

NOTE: *When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.*

12. If the Appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call the gas supplier.

Turning Off Gas to Unit

1. Set the thermostat to the lowest settling.
2. Turn **OFF** all electrical power to the unit if service is to be performed.
3. Remove the access panel.
4. Move the gas valve switch to the **OFF** position.
5. Replace the access panel.

Failure To Operate

If the unit fails to operate, check the following:

1. Is the thermostat calling for heat?
2. Are access panels securely in place?
3. Is the main disconnect switch closed?
4. Is there a blown fuse?
5. Is the filter dirty or plugged? Dirty or plugged filters will cause the limit conrol to shut the unit off.
6. Is gas turned on at the meter?
7. Is the manual main shut Off valve open?
8. Is the gas valve turned on?
9. Is the unit ignition system in lock out: If the unit locks out again, inspect the unit for blockages.
10. Is blower harness connected to ignition control? Furnace will not operate unless harness is connected.

Gas Pressure Measurement

Gas Flow (Approximate)

GAS METER CLOCKING CHART				
A96DFMV UNIT	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
-70	55	110	136	272
-90	41	82	102	204
-110	33	66	82	164
Natural-1000 btu/cu ft LP-2500 btu/cu ft				

Table 21

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time.) **Divide by two** and compare to time in Table 21. If manifold pressure matches Table 24 and rate is incorrect, check gas orifices for proper size and restriction. Remove temporary gas meter if installed.

NOTE: *To obtain accurate reading, shut off all other gas appliances connected to meter.*

Supply Pressure Measurement

A threaded plug on the inlet side of the gas valve provides access to the supply pressure tap. Remove the threaded plug, install a field provided barbed fitting and connect a manometer to measure supply pressure. Replace the threaded plug after measurements have been taken.

Proper Combustion

Furnace should operate a minimum of 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue outlet and compare to the tables below. The maximum carbon monoxide reading should not exceed 50 ppm.

High Fire

A96DFMV UNIT	CO_2% For Nat	CO_2% For L.P.
070B12	7.6 - 8.6	9.1 - 10.1
090C12		
090C16		
090C20		
110C20		

Table 22

Low Fire

A96DFMV UNIT	CO_2% For Nat	CO_2% For L.P.
070B12	5.7	7.2 - 8.2
090C12	5.3 - 6.3	6.8 - 7.8
090C16		
090C20		
100C20		

Table 23

High Altitude Information

NOTE: *In Canada,certification for installationa at elevations over 4500 feet (1372 m) is the jurisidiction of local authorities.*

These units require no manifold pressure adjustments for operation at altitudes up to 7,500 feet (2286 m) above sea level. Table 24 lists conversion kit requirements, pressure switch requirements and manifold pressures at all altitudes.

The combustion air pressure switch is factory set and requires no adjustment.

NOTE: *A natural to LP/propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.*

Conversion Kit Requirements and Manifold Test Pressures

Model Input Size	LP/Propane Kit	Manifold Pressure at All Altitudes (in. w.g.)				Gas Orifice Size	
	0 - 7,500 (0 - 2286 m)	Low Fire (35% rate)		High Fire (100% rate)			
		Natural Gas	LP/Propane	Natural Gas	LP/Propane	Nat	LP
-070	65W77	0.4 - 0.6	1.2 - 1.8	3.2 - 3.8	9.5 - 10.5	0.0625	0.034
-090							
-110							

NOTE: *The values given in table are measurements only. The gas valve should not be adjusted.*

Table 24

Manifold Pressure Measurement

To correctly measure manifold pressure, the differential pressure between the positive gas manifold and the negative burner box must be considered. Use pressure test adapter kit (available as part 10L34) to assist in measurement.

1. Remove the threaded plug from the outlet side of the gas valve and install a field provided barbed fitting. Connect test gauge "+" connection to barbed fitting to measure manifold pressure.
2. Tee into the gas valve regulator vent hose and connect test gauge "-" connection.
3. Start unit on low heat (35% rate) and allow 5 minutes for unit to reach steady state.
4. While waiting for the unit to stabilize, notice the flame. Flame should be stable and should not lift from burner. Natural gas should burn blue.
5. After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in Table 24.
6. Repeat steps 3, 4 and 5 on HIGH HEAT.

NOTE: *Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to remove barbed fitting and replace threaded plug.*

⚠ CAUTION

DO NOT attempt to make adjustments to the gas valve.

Other Unit Adjustments

Primary Limit

The primary limit is located on the heating compartment vestibule panel. This limit is factory set and requires no adjustment.

Flame Rollout Switches (Two)

These manually reset switches are located on the inside of the burner box.

Pressure Switches (Two)

The pressure switches are located on the cold end header box. These switches check for proper combustion air inducer operation before allowing ignition trial. The switches are factory set and require no adjustment.

Temperature Rise

After the furnace has been started and supply and return air temperatures have been allowed to stabilize, check the temperature rise with the unit operating at 100 percent firing rate. If necessary, adjust the blower speed to maintain the temperture rise within the range shown on the unit nameplate. Increase the blower speed to decrease the temperature. Decrease the blower speed to increase the temperature rise. Failure to adjust the temperature rise may cause erratic limit operation.

Thermostat Heat Anticipation

Set the heat anticipator setting (if adjustable) according to the amp draw listed on the wiring diagram that is attached to the unit.

Electrical

1. Check all wiring for loose connections.
2. Check for the correct voltage at the furnace (furnace operating).Correct voltage is 120VAC + 10%.
3. Check amp draw on the blower motor with inner blower panel in place.
   Motor Nameplate_____ Actual_____

Electronic Ignition

The integrated control has a feature that serves as an automatic reset device for ignition control lockout caused by ignition failure. This type of lockout is usually due to low gas line pressure. After one hour of continuous thermostat demand for heat, the control will break and remake thermostat demand to the furnace and automatically reset the control to begin the ignition sequence.

Exhaust and Air Intake Pipe

1. Check exhaust and air intake connections for tightness and to make sure there is not blockage.
2. Are pressure switches closed? Obstructed exhaust pipe will cause unit to shut off at pressure switches. Check termination for blockages.
3. Reset manual flame rollout switches on burner box cover.

Heating Sequence of Operation

The integrated control initiates a pressure switch calibration at the initial unit start-up on a call for heat. The ignition control will also initiate a calibration any time main power is turned off and back on and a heating demand is present. Additional calibrations may be initiated by the service technician during field test sequence. The following heating sequence of operation assumes completion of a successful calibration.

NOTE: *The thermostat selection DIP switch on the integrated control is factory set in the "TWO STAGE" position.*

Applications Using a Two Stage Thermostat

A-Heating Sequence - Control Thermostat Selection DIP switch in "Two Stage" Position (Factory Settling)

1. On a call for heat, thermostat first stage contacts close sending a signal to the integrated control. The integrated control runs a self diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at ignition speed, Which is approximately the same as the inducer speed at 70 percent firing rate.
2. Once the control receives a signal that the low fire pressure switch has closed, the combustion air inducer begins a 15 second prepurge in the ignition speed.
3. After the prepurge is complete, a 20 second initial ignitor warm up period begins. The combustion air inducer continues to operate at the ignition speed.
4. After the 20 second warm up period has ended, the gas valve is energized and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 30 second ON delay. When the delay ends, the indoor blower motor is energized at a speed that matches the firing rate. After the 10 second ignition stabilization delay expires, the inducer speed is adjusted to the appropriate target rate. The inducer will remain at the 70 percent speed as long as the thermostat has a first stage heating demand.
5. If second stage heat is required, the thermostat second stage heat contacts close and send a signal to the integrated control. The integrated control initiates a 30 second, second stage recognition delay.
6. At the end of the recognition delay and on all subsequent calls for heat in the same heating cycle, the intergrated control energizes the combustion air inducer at high speed. The control also checks the high fire pressure switch to make sure it is closed. As the inducer speed is increased to high, the indoor blower motor is adjusted to a speed which is appropriate for the target rate.
7. When the demand for high fire (second stage) heat is satisfied, the gas valve is de-energized and the field selected indoor blower off delay begins. The combustion air inducer begins a 20 second post purge period.
8. When the combustion air post purge period is complete, the inducer is de-energized. The indoor blower is de-energized at the end of the off delay.

Application Using a Two Stage Thermostat

B - Heating Sequence - Control Thermostat Selection DIP switch in "Variable Capacity" Position

1. On a call for heat, thermostat first stage contacts close sending a signal to the integrated control. The integrated control runs a self diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at ignition speed, which is approximately the same as the inducer speed at 70 percent firing rate.
2. Once the control receives a signal that the low fire pressure switch has closed, the combustion air inducer begins a 15 second prepurge in low speed.
3. After the prepurge is complete, a 20 second initial ignitor warm-up period begins. The combustion air inducer continues to opeate at the ignition speed.
4. After the 20 second warm up period has ended, the gas valve is energized and ignition occurs. At the same time, the control module begins an indoor blower 30 second ON delay. When the delay ends, the indoor blower motor is energized at a speed that matches the firing rate. After the 10 second ignition stabilization delay expires, the inducer speed is adjusted to the appropriate target rate. If the furnace is operating in the initial heating cycle after power up, the initial firing rate will be approximately 35 percent. The firing rate on subsequent cycles will be automatically adjusted by the integrated control based on thermostat cycles. The firing rate will vary and will range from 35 percent to 90 percent. The furnace will continue this operation as long as the thermostat has a first stage heating demand.

5. If second-stage heat is required, the thermostat second stage heat contacts close and send a signal to the integrated control. The integrated control either increases the firing rate to 70 percent (if the current rate is at or below 60 percent) or increases the firing rate by 10 percent (if the current rate is above 60 percent). If the call for heat continues 5 minutes beyond this initial upstage, the rate will be increased by 10 percent every 5 minutes until the call for heat is satisfied or the furnace reaches 100 percent rate. As the firing rate increases, the indoor blower motor is adjusted to a speed which is appropriate for the target rate.
6. If second-stage heat demand is satisfied, but first stage is still present, the furnace will continue to operate at the present firing rate until the heat cycle ends.
7. When the demand for first and second stage heat is satisfied, the gas valve is de-energized and the fieldselected indoor blower off delay begins. The combustion air inducer begins a 20 second post-purge period.
8. When the combustion air post purge period is complete, the inducer is de-energized. The indoor blower is de-energized at the end of the off delay.

Applications Using A Single-Stage Thermostat

C - Heating Sequence -- Control Thermostat Selection DIP switch in "Single Stage" Position

1. On a call for heat, thermostat first stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at the ignition speed, which is approximately the same as the inducer speed at 70 percent firing rate.
2. Once the control receives a signal that the low fire pressure switch has closed, the combustion air inducer begins a 15 second prepurge at the ignition speed.
3. After the prepurge is complete, a 20 second initial ignitor warm up period begins. The combustion air inducer continues to operate at the ignition speed.
4. After the 20 second warm up period has ended, the gas valve is energized and ignition occurs, which initiates a 10 second ignition stabilization delay. At the same time, the control module sends a signal to begin an indoor blower 30 second **ON** delay. When the delay ends, the indoor blower motor is energized at a speed which is appropriate for the firing rate. After the 10 second ignition stabilization delay expires, the inducer speed is adjusted to 35 percent speed. The integrated control also initiates a second-stage on delay (factory set at 7 minutes; adjustable to 12 minutes).
5. If the heating demand continues beyond the secondstage on delay, the integrated control energizes the combustion air inducer at 70 percent speed. The indoor blower motor is adjusted to a speed which matches the target rate. A fixed, 1O minute third stage on delay is initiated.
6. If the heating demand continues beyond the thirdstage on delay, the integrated control energizes the inducer at high speed. The indoor blower motor is adjusted to a speed which is appropriate for the target rate.
7. When the thermostat heating demand is satisfied, the gas valve is de-energized and the combustion air inducer begins a 20 second post purge. The field selected indoor blower off delay begins.
8. When the combustion air post purge period is complete, the inducer is de-energized. The indoor blower is de-energized at the end of the off delay.

Service

⚠ WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD.

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

Improper servicing could result in dangerous operation, serious injury, death, or property damage.

Before servicing, disconnect all electrical power to furnace.

When servicing controls, label all wires prior to disconnecting. Take care to reconnect wires correctly. Verify proper operation after servicing.

At the beginning of each heating season, system should be checked as follows by a qualified service technician:

Blower

Check the blower wheel for debris and clean if necessary. The blower motors are prelubricated for extended bearing life. No further lubrication is needed.

⚠ WARNING

The blower access panel must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

Filters

All filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filters when necessary to ensure proper furnace operation. Table 1 lists recommended filter sizes.

Exhaust and air intake pipes

Check the exhaust and air intake pipes and all connections for tightness and to make sure there is no blockage.

NOTE: *After any heavy snow, ice or frozen fog event the furnace vent pipes may become restricted. Always check the vent system and remove any snow or ice that may be obstructing the plastic intake or exhaust pipes.*

Electrical

1. Check all wiring for loose connections.
2. Check for the correct voltage at the furnace (furnace operating).
3. Check amp-draw on the blower motor.
   Motor Nameplate_____Actual_____

Winterizing and Condensate Trap Care

1. Turn off power to the unit.
2. Have a shallow pan ready to empty condensate water.
3. Remove the drain cap from the condensate trap and empty water. Inspect the trap then reinstall the drain cap.

Cleaning Heat Exchanger

If cleaning the heat exchanger becomes necessary, follow the below procedures and refer to Figure 1 when disassembling unit. Use papers or protective covering in front of furnace while removing heat exchanger assembly.

1. Turn off electrical and gas supplies to the furnace.
2. Remove the furnace access panels.
3. Disconnect the 2 pin plug from the gas valve.
4. Remove gas supply line connected to gas valve. Remove the burner box cover and remove gas valve manifold assembly.
5. Remove sensor wire from sensor. Disconnect 2 pin plug from the ignitor.
6. Disconnect wires from flame rollout switches.
7. Remove four burner box screws at the vestibule panel and remove burner box. Set burner box assembly aside.

NOTE: *If necessary, clean burners at this time. Follow procedures outlined in Burner Cleaning section.*

8. Loosen the clamps to the flexible exhaust coupling.
9. Disconnect condensate drain line from the cold end header box.
10. Disconnect condensate drain tubing from flue collar. Remove screws that secures the flue collar into place. Remove flue collar. It may be necessary to cut the exiting exhaust pipe for removal of the fitting.
11. Mark and disconnect all combustion air pressure tubing from cold end header collector box.
12. Mark and remove wires from pressure switches. Remove pressure switches. Keep tubing attached to pressure switches.
13. Disconnect the 4 pin plug from the combustion air inducer. Remove two screws which secure combustion air inducer to collector box. Remove combustion air inducer assembly. Remove ground wire from vest panel.
14. Remove electrical junction box from the side of the furnace.
15. Mark and disconnect any remaining wiring to heating compartment components. Disengage strain relief bushing and pull wiring and bushing through the hole in the blower deck.
16. Remove the primary limit from the vestibule panel.
17. Remove two screws from the front cabinet flange at the blower deck. Spread cabinet sides slightly to allow clearance for removal of heat exchanger.

18. Remove screws along vestibule sides and bottom which secure vestibule panel and heat exchanger assembly to cabinet. Remove two screws from blower rail which secure bottom heat exchanger flange. Remove heat exchanger from furnace cabinet.
19. Back wash heat exchanger with soapy water solution or steam. If steam is used it must be below 275°F (135°C).
20. Thoroughly rinse and drain the heat exchanger. Soap solutions can be corrosive. Take care to rinse entire assembly.
21. Reinstall heat exchanger into cabinet making sure that the clamshells of the heat exchanger assembly are resting on the support located at the rear of the cabinet. Remove the indoor blower to view this area through the blower opening.
22. Re-secure the supporting screws along the vestibule sides and bottom to the cabinet.
23. Reinstall cabinet screws on front flange at blower deck.
24. Reinstall the primary limit on the vestibule panel.
25. Route heating component wiring through hole in blower deck and reinsert strain relief bushing.
26. Reinstall electrical junction box.
27. Reinstall the combustion air inducer. Reconnect the 4 pin plug to the wire harness.
28. Reinstall pressure switches and reconnect pressure switch wiring.
29. Carefully connect combustion air pressure switch hosing from pressure switches to proper stubs on cold end header collector box.
30. Reconnect condensate drain line to the cold end header box.
31. Use securing screws to reinstall flue collar to the top cap on the furnace. Reconnect exhaust piping and exhaust drain tubing.
32. Replace flexible exhaust adapter on combustion air inducer and flue collar. Secure using two existing hose clamps.
33. Reinstall burner box assembly in vestibule area.
34. Reconnect flame roll-out switch wires.
35. Reconnect sensor wire and reconnect 2 pin plug from ignitor.
36. Secure burner box assembly to vestibule panel using four existing screws. Make sure burners line up in center of burner ports.
37. Reinstall gas valve manifold assembly. Reconnect gas supply line to gas valve.
38. Reinstall burner box cover.
39. Reconnect 2 pin plug to gas valve.
40. Replace the blower compartment access panel.
41. Refer to instruction on verifying gas and electrical connections when re-establishing supplies.
42. Follow lighting instructions to light and operate furnace for 5 minutes to ensure that heat exchanger is clean and dry and that furnace is operating properly.
43. Replace heating compartment access panel.

Cleaning the Burner Assembly

1. Turn off electrical and gas power supplies to furnace. Remove upper and lower furnace access panels.
2. Disconnect the 2 pin plug from the gas valve.
3. Remove the burner box cover.
4. Disconnect the gas supply line from the gas valve. Remove gas valve/manifold assembly.
5. Mark and disconnect sensor wire from the sensor. Disconnect wires from flame rollout switches.
6. Remove four screws which secure burner box assembly to vest panel. Remove burner box from the unit.
7. Use the soft brush attachment on a vacuum cleaner to gently clean the face of the burners. Visually inspect the inside of the burners and crossovers for any blockage caused by foreign matter. Remove any blockage.
8. Reinstall the burner box assembly using the existing four screws. Make sure that the burners line up in the center of the burner ports.
9. Reconnect the sensor wire and reconnect the 2 pin plug to the ignitor wiring harness. Reconnect wires to flame rollout switches.
10. Reinstall the gas valve manifold assembly. Reconnect the gas supply line to the gas valve. Reinstall the burner box cover.
11. Reconnect 2 pin plug to gas valve.
12. Replace the blower compartment access panel.
13. Refer to instruction on verifying gas and electrical connections when re-establishing supplies.
14. Follow lighting instructions to light and operate furnace for 5 minutes to ensure that heat exchanger is clean and dry and that furnace is operating properly.
15. Replace heating compartment access panel.

Planned Service

A service technician should check the following items during an annual inspection. Power to the unit must be shut off for the service technician's safety.

Burners - Must be inspected for rust, dirt, or signs of water.

Vent pipe - Must be inspected for signs of water, cracked, damaged or sagging pipe, or disconnected joints.

Unit appearance - Must be inspected for rust, dirt, signs of water, burnt or damaged wires, or components.

Blower access door - Must be properly in place and provide a seal between the return air and the room where the furnace is installed.

Return air duct - Must be properly attached and provide an air seal to the unit.

Operating performance - Unit must be observed during operation to monitor proper performance of the unit and the vent system.

Combustion gases - Flue products must be analyzed and compared to the unit specifications.

Problems detected during the inspection may make it necessary to temporarily shut down the furnace until the items can be repaired or replaced.

Instruct the homeowners to pay attention to their furnace. Situations can arise between annual furnace inspections that may result in unsafe operation.

Integrated Control Diagnostic Codes

Press the diagnostic push button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed.
Release the button when the desired mode is displayed.
When a solid "P" is displayed, the furnace capacity/ size is programmed.
When the solid "E" is displayed, the control enters the Error Code Recall mode. Error Code Recall mode menu options: No change (displaying error history) remains in Error Code Recall mode; solid "b" exits Error Code Recall mode; and solid "c" clears the error history. Must press button while flashing "c" is displayed to clear error codes.
When the solid "-" is displayed, the control enters the Field Test mode. Field Test mode menu options: Solid "C" starts pressure switch calibration; blinking "-" exits Field Test mode.

FLASH CODE	DIAGNOSTIC CODES/STATUS OF FURNACE
-	Idle Mode (Decimal blinks at 1 Hz 0.5 sec. On and 0.5 sec. Off)
A	CFM Displayed (1 sec. On, 0.5 sec. Off, CFM value)
C	Staged Cooling (1 sec. On 0.5 sec. Off 1 or 2 stage 1 Sec. pause CFM pause, Repeat Codes)
d	Dehumidification Mode (1 sec. On, Off 1 sec., CFM, Pause, Repeat Codes)
h	Modulating Heat (1 sec. On 0.5 sec. Off % of input rate Pause CFM Pause Repeat Codes)
H	Staged Heat (1 sec. On 0.5 sec. Off 1 or 2 stage 1 Sec. CFM pause, Repeat Codes)
110	Low Line Voltage
113	High Line Voltage
115	Low 24V (*control will restart if the error recovers).
125	Control failed self check, internal error, failed hardware. Control will restart if the error recovers.
180	Outdoor Air sensor failure - no error if just disconnected, only show if shorted or out of range
200	Rollout circuit open or previously opened
201	Circulator/COM failure - no error is if just disconnected, only show if shorted or out of range
202	Circulator motor/resistor mis-match or resistor missing
204	Gas Valve Miswired - Resume normal operation after error corrected
223	Low Pressure Switch Failed Open
224	Low Pressure Switch Failed Closed
225	High Pressure Switch Failed Open
226	High Pressure Switch Failed Closed
227	Low Pressure Switch Opened during TFI or Run mode
228	Unable to perform successful pressure switch calibration routine
240	Low Flame Current - Run Mode
241	Flame sense out of sequence - flame still present
250	Limit switch circuit open
270	Exceed maximum number of retries. No flame current sensed.
271	Exceeded maximum number ignition retries where the last retry was due to the pressure switch opening.
272	Exceeded minimum number of recycles where the last recycle was due to the pressure switch opening.
273	Exceeded maximum number of recycles where the last recycle was due to a flame failure.
274	The limit remained open longer than three minutes.
275	Flame sensed out of sequence; flame signal gone.
290	Ignitor Circuit Fault - failed ignitor or triggering circuitry
291	Restricted airflow - available CFM below min firing rate
292	Circulator motor unable to start (seized bearings, stuck wheel, etc.)
294	Inducer motor amp draw too high
310	Discharge Air sensor failure - no error if just disconnected, only show if shorted or out of range
311	Restricted airflow heating mode - target input rate reduced to match available circulatory CFM
312	Restricted airflow cooling or continuous fan mode - informational only

CONFIGURING UNIT SIZE CODE

Power-Up - Number displayed represents by integrated control unit size code (furnace model and capacity). If three horizontal bars are displayed followed by continuous E203, furnace control does not recognize **unit size code**. Configure per the following:

Furnace control in **IDLE** mode No heating, cooling or indoor fan operation)

Yes

No

Turn room thermostat to **OFF**

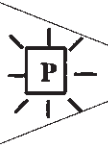
To enter **Field Test Mode:** push and hold button next to 7-segment LED display until **solid dash** symbol appears. Release button.

If alarm is present, furnace control will display error code. If alarm is not present solid **dash** starts blinking on 7-segment LED display.

Push and hold button until the solid **P** symbol is displayed on the 7-segment LED. Release button. This mode allows the user to select a unit size code number that matches the furnace model size and capacity.

***IMPORTANT**: Field replacement controls may need to be manually configured to validate furnace unit size code.*

Solid **P** starts blinking on 7-Segment LED



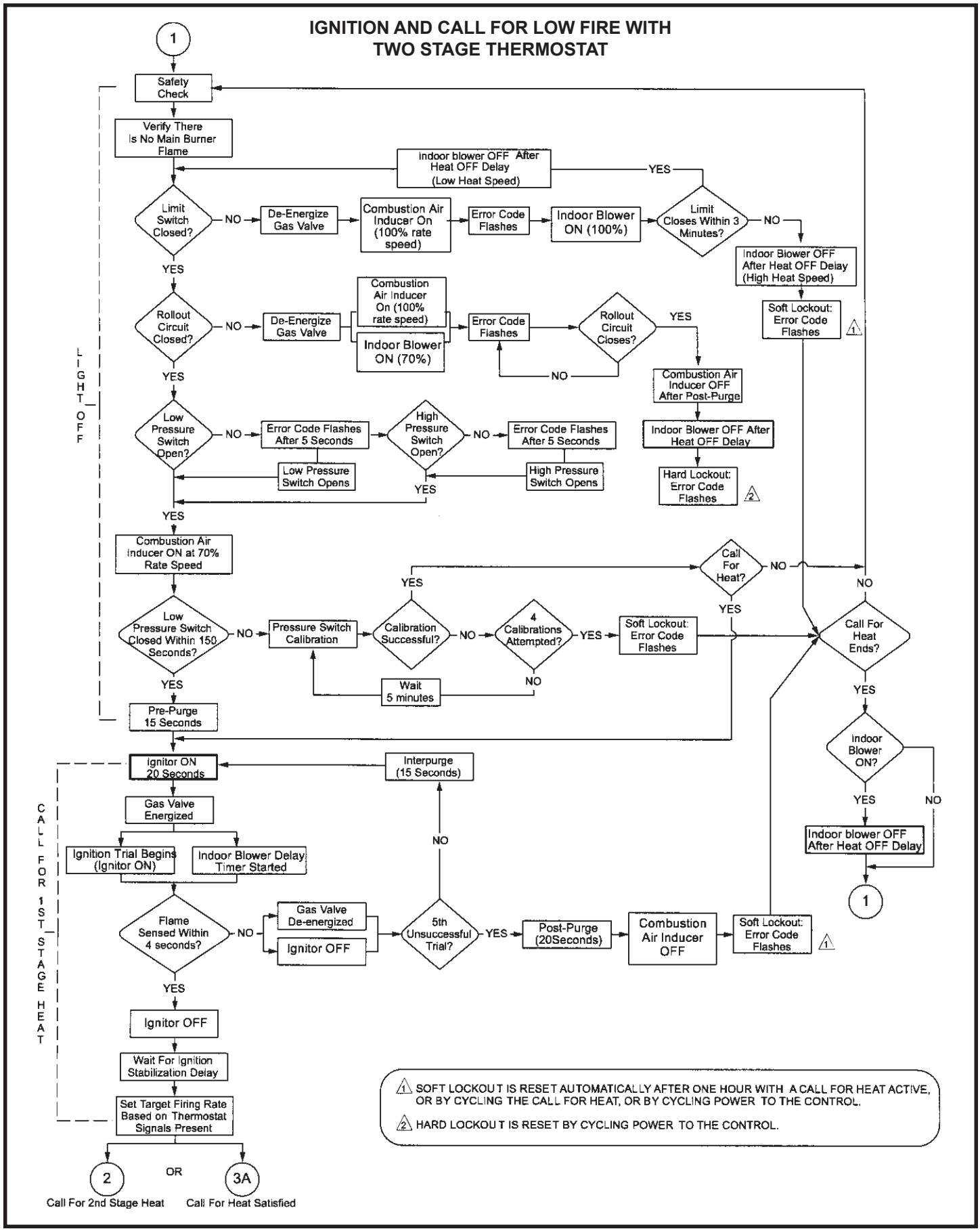
Push and hold button. Integrated control will display unit size code number for each furnace model for five seconds.

UNIT SIZE CODE	FURNACE MODEL
1	A96DFMV070B12
2	A96DFMV090C12
3	A96DFMV090C16
4	A96DFMV090C20
5	A96DFMV110C20

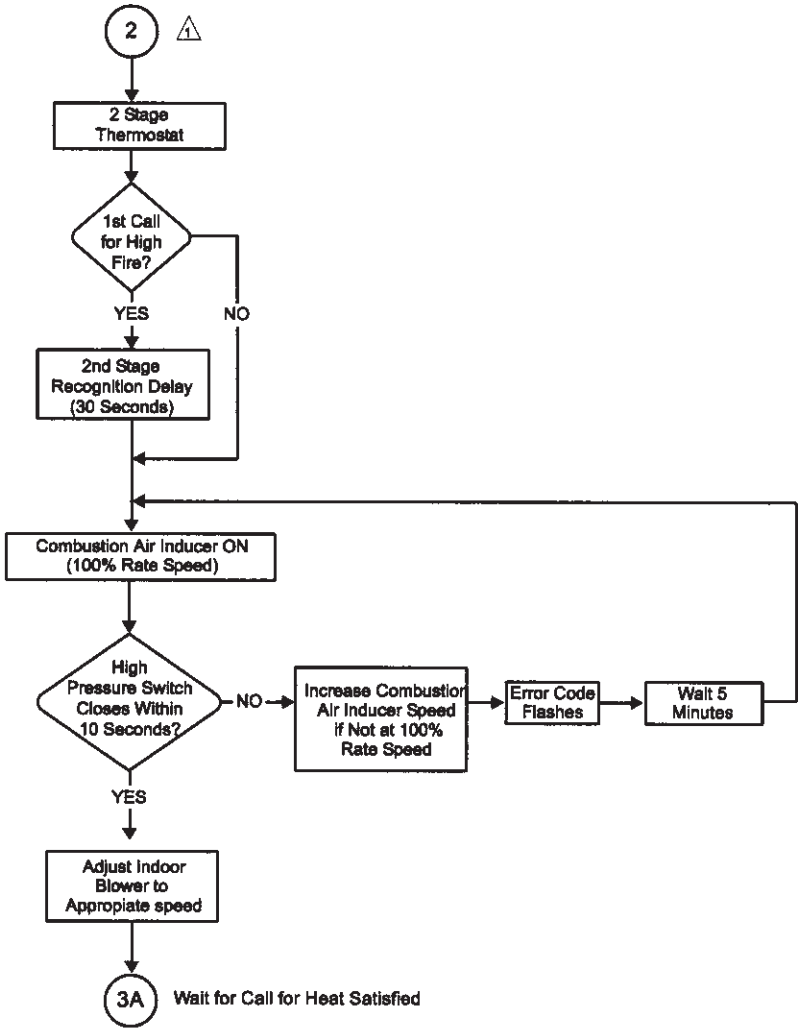
When the correct unit size code is displayed, release button. Selected code will flash for 10-second period. During that period, hold push button until code stops blinking (disappear for 2 seconds). Integrated control will store code in memory and will automatically exit **Field Test Mode** and reset. (If second period expires or push button is held less than five seconds, control will automatically exit **Field Test Mode** and go into **IDLE** mode without storing unit size code. If this happens, programming function must be repeated).

Verify that the selected unit size code is correct and stored in non-volatile memory by cycling the 24 volt power to the furnace control. (At 24 volt power-up of the furnace control, the 7-segment LED will display a unit size code. If three horizontal bars display, board does not recognize unit size code. Programming function must be repeated)

FINISHED


IGNITION AND CALL FOR LOW FIRE WITH TWO STAGE THERMOSTAT
1
Safety Check
Verify There Is No Main Burner Flame
Indoor blower OFF After Heat OFF Delay (Low Heat Speed)
YES
Limit Switch Closed?
NO
De-Energize Gas Valve
Combustion Air Inducer On (100% rate speed)
Error Code Flashes
Indoor Blower ON (100%)
Limit Closes Within 3 Minutes?
NO
Indoor Blower OFF After Heat OFF Delay (High Heat Speed)
Soft Lockout: Error Code Flashes
1
YES
Rollout Circuit Closed?
NO
De-Energize Gas Valve
Combustion Air Inducer On (100% rate speed)
Indoor Blower ON (70%)
Error Code Flashes
Rollout Circuit Closes?
YES
NO
Combustion Air Inducer OFF After Post-Purge
Indoor Blower OFF After Heat OFF Delay
Hard Lockout: Error Code Flashes
2
LIGHT OFF
YES
Low Pressure Switch Open?
NO
Error Code Flashes After 5 Seconds
Low Pressure Switch Opens
High Pressure Switch Open?
NO
Error Code Flashes After 5 Seconds
High Pressure Switch Opens
YES
YES
Combustion Air Inducer ON at 70% Rate Speed
Call For Heat?
NO
YES
YES
NO
Low Pressure Switch Closed Within 150 Seconds?
NO
Pressure Switch Calibration
Calibration Successful?
NO
4 Calibrations Attempted?
YES
Soft Lockout: Error Code Flashes
Call For Heat Ends?
YES
Wait 5 minutes
NO
YES
Pre-Purge 15 Seconds
Indoor Blower ON?
YES
NO
Indoor blower OFF After Heat OFF Delay
1
Ignitor ON 20 Seconds
Interpurge (15 Seconds)
Gas Valve Energized
NO
Ignition Trial Begins (Ignitor ON)
Indoor Blower Delay Timer Started
CALL FOR 1ST STAGE HEAT
Flame Sensed Within 4 seconds?
NO
Gas Valve De-energized
Ignitor OFF
5th Unsuccessful Trial?
YES
Post-Purge (20Seconds)
Combustion Air Inducer OFF
Soft Lockout: Error Code Flashes
1
YES
Ignitor OFF
Wait For Ignition Stabilization Delay
Set Target Firing Rate Based on Thermostat Signals Present
2
Call For 2nd Stage Heat
OR
3A
Call For Heat Satisfied
1 SOFT LOCKOUT IS RESET AUTOMATICALLY AFTER ONE HOUR WITH A CALL FOR HEAT ACTIVE, OR BY CYCLING THE CALL FOR HEAT, OR BY CYCLING POWER TO THE CONTROL.
2 HARD LOCKOUT IS RESET BY CYCLING POWER TO THE CONTROL.

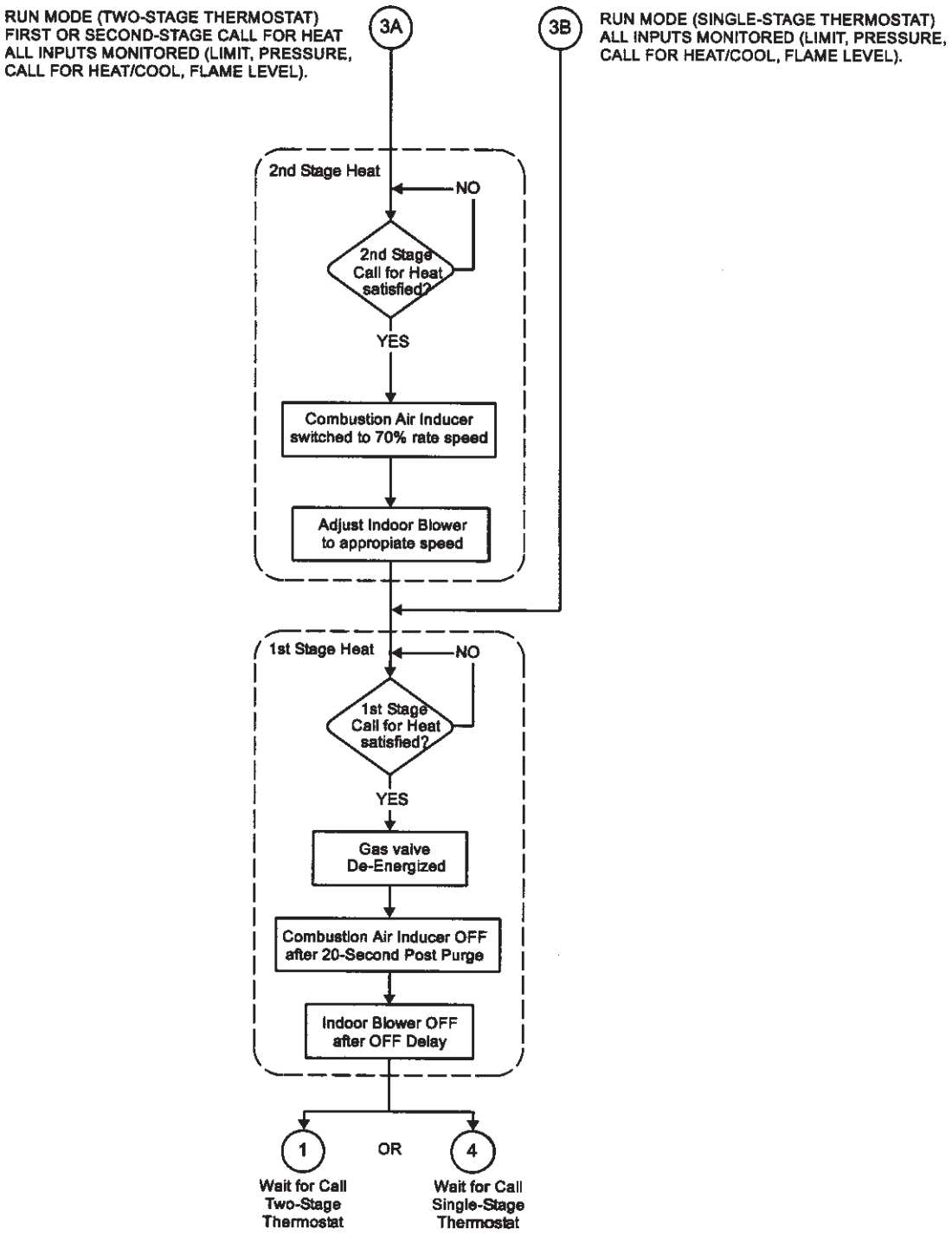
CALL FOR HIGH FIRE WITH TWO STGE THERMOSTAT

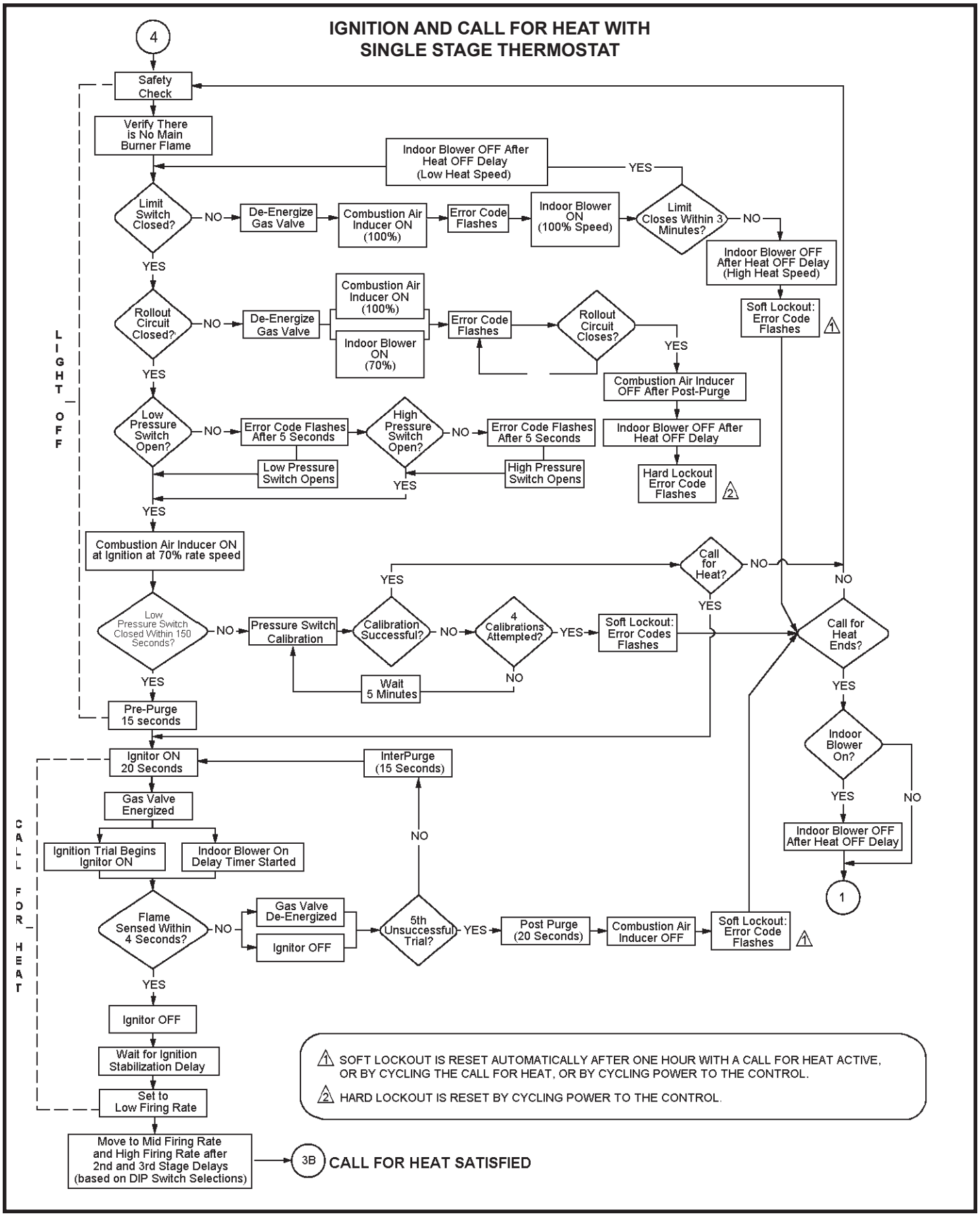


1 System will always light at 70% even if 2nd stage call for heat is in place

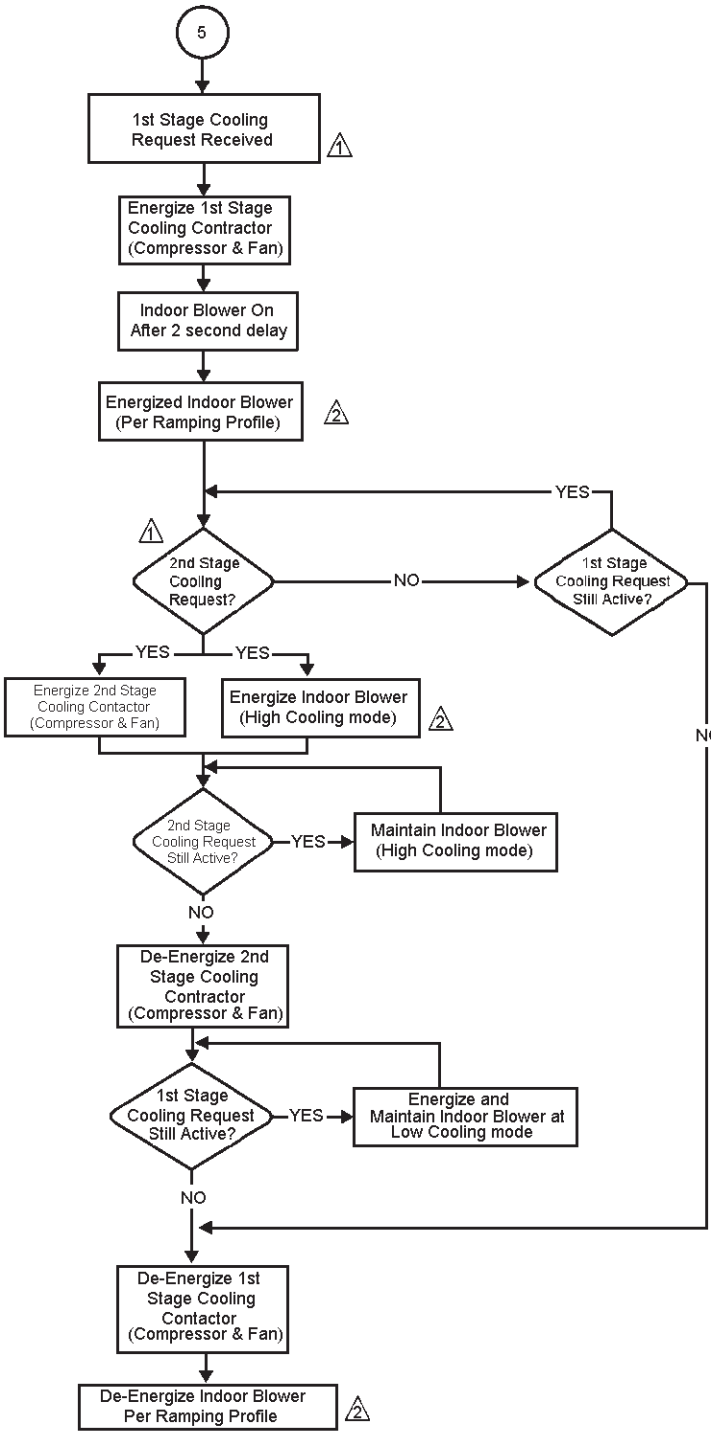
2 If the high pressure switch does not close within 5 attempts, the system will operate at low fire for the remainder of the call for heat at request

CALL FOR HEAT SATISFIED




IGNITION AND CALL FOR HEAT WITH SINGLE STAGE THERMOSTAT
4
Safety Check
Verify There is No Main Burner Flame
Indoor Blower OFF After Heat OFF Delay (Low Heat Speed)
YES
Limit Switch Closed?
NO
De-Energize Gas Valve
Combustion Air Inducer ON (100%)
Error Code Flashes
Indoor Blower ON (100% Speed)
Limit Closes Within 3 Minutes?
NO
Indoor Blower OFF After Heat OFF Delay (High Heat Speed)
Soft Lockout: Error Code Flashes
1
YES
Rollout Circuit Closed?
NO
De-Energize Gas Valve
Combustion Air Inducer ON (100%)
Indoor Blower ON (70%)
Error Code Flashes
Rollout Circuit Closes?
YES
Combustion Air Inducer OFF After Post-Purge
Indoor Blower OFF After Heat OFF Delay
Hard Lockout Error Code Flashes
2
YES
Low Pressure Switch Open?
NO
Error Code Flashes After 5 Seconds
Low Pressure Switch Opens
High Pressure Switch Open?
NO
Error Code Flashes After 5 Seconds
High Pressure Switch Opens
YES
YES
Combustion Air Inducer ON at Ignition at 70% rate speed
Call for Heat?
NO
YES
NO
Low Pressure Switch Closed Within 150 Seconds?
NO
Pressure Switch Calibration
Calibration Successful?
NO
4 Calibrations Attempted?
YES
Soft Lockout: Error Codes Flashes
Wait 5 Minutes
NO
YES
Call for Heat Ends?
YES
Pre-Purge 15 seconds
Indoor Blower On?
YES
NO
Indoor Blower OFF After Heat OFF Delay
1
Ignitor ON 20 Seconds
InterPurge (15 Seconds)
Gas Valve Energized
Ignition Trial Begins Ignitor ON
Indoor Blower On Delay Timer Started
NO
Flame Sensed Within 4 Seconds?
NO
Gas Valve De-Energized
Ignitor OFF
5th Unsuccessful Trial?
YES
Post Purge (20 Seconds)
Combustion Air Inducer OFF
Soft Lockout: Error Code Flashes
1
YES
Ignitor OFF
Wait for Ignition Stabilization Delay
Set to Low Firing Rate
Move to Mid Firing Rate and High Firing Rate after 2nd and 3rd Stage Delays (based on DIP Switch Selections)
3B
CALL FOR HEAT SATISFIED
LIGHT OFF
CALL FOR HEAT
1 SOFT LOCKOUT IS RESET AUTOMATICALLY AFTER ONE HOUR WITH A CALL FOR HEAT ACTIVE, OR BY CYCLING THE CALL FOR HEAT, OR BY CYCLING POWER TO THE CONTROL.
2 HARD LOCKOUT IS RESET BY CYCLING POWER TO THE CONTROL.

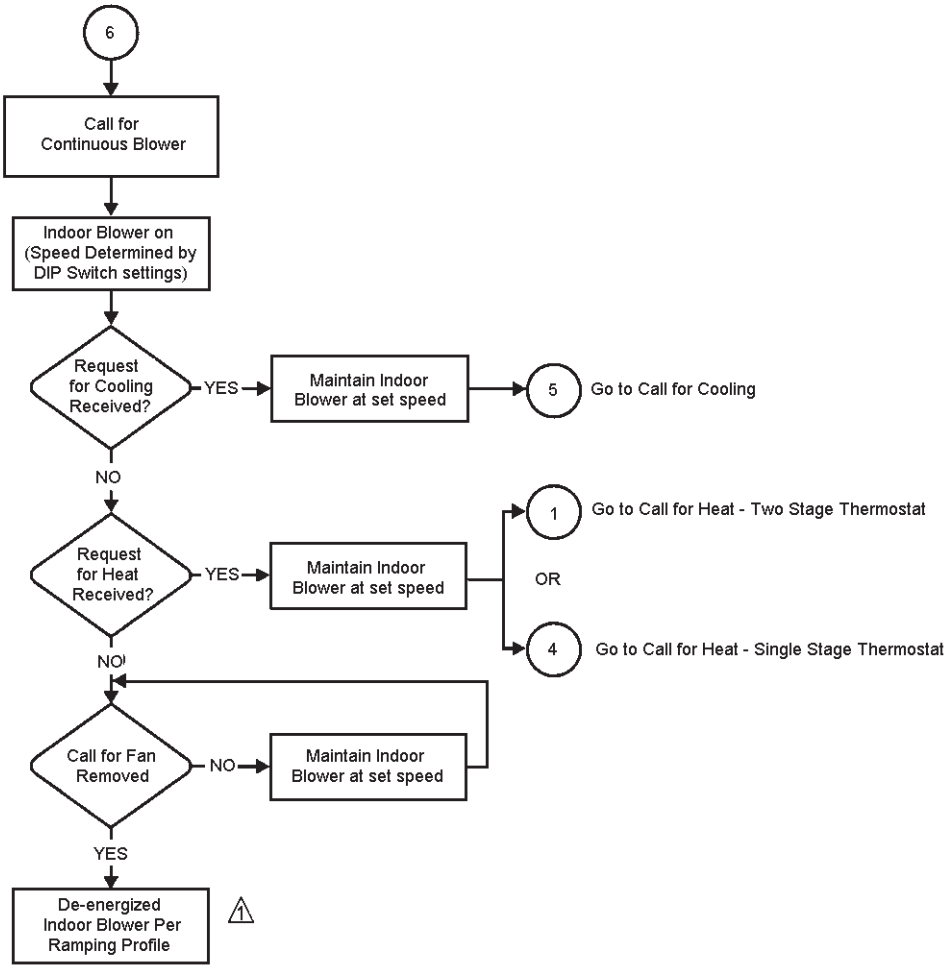
CALL FOR COOLING



1 2nd stage cooling operation requires a 2 stage thermostat, a 2 stage cooling system and on board link W915 must be cut. The control will not respond to a 2nd stage cooling request unless a 1st stage cooling request is active.

2 Indoor blower cooling mode and high cooling mode have a specific ON, OFF and speed ramping profiles. The specific profile is selected using the DIP switches on the control.

Continuous Low Speed Indoor Blower Sequence of Operation



1 Indoor blower low cooling mode and high cooling mode, have specific ON - OFF and speed ramping profiles. The specifice profile is selected using the DIP switches on the control.

REPAIR PARTS LIST

The following repair parts are available through Allied Air distributors. When ordering parts, include the complete furnace model number listed on the nameplate. **All service must be performed by a licensed professional installer (or equivalent), service agency, or gas supplier.**

Cabinet Parts

- Outer Access Panel
- Blower Access Panel
- Top Cap

Control Panel Parts

- Transformer
- Integrated Control Board
- Door Interlock Switch
- Circuit Breaker

Blower Parts

- Blower Wheel
- Motor
- Motor Mounting Frame
- Blower Housing Cut Off Plate

Heating Parts

- Flame Sensor
- Heat Exchanger Assembly
- Gas Manifold
- Combustion Air Inducer
- Gas Valve
- Main Burner Cluster
- Main Burner Orifices
- Pressure Switch
- Ignitor
- Primary Limit Control
- Flame Rollout Switches

REQUIREMENTS for COMMONWEALTH of MASSACHUSETTS

Modifications to NFPA-54, Chapter 10

Revise NFPA-54 section 10.8.3 to add the following requirements:

For all side wall, horizontally vented, gas-fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above the finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall, horizontally vented, gas-fueled equipment, the installing plumber or gas fitter shall observe that a hard-wired carbon monoxide detector with an alarm and battery backup is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gas fitter shall observe that a battery-operated or hard-wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall, horizontally vented, gas-fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard-wired carbon monoxide detectors.
   a. In the event that the side wall, horizontally vented, gas-fueled equipment is installed in a crawl space or an attic, the hard-wired carbon monoxide detector with alarm and battery backup may be installed on the next adjacent floor level.
   b. In the event that the requirements of this subdivision cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery-operated carbon monoxide detector with an alarm shall be installed.
2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.
3. **SIGNAGE**. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented, gas-fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, **"GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS."**
4. INSPECTION. The state or local gas inspector of the side wall, horizontally vented, gas-fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

EXEMPTIONS: The following equipment is exempt from 24 CMR 5.08(2)(a) 1 through 4:

1. The equipment listed in Chapter 10 entitled "Equipment Not Required to Be Vented" in the most current edition of NFPA 54 as adopted by the Board; and
2. Product Approved side wall, horizontally vented, gas-fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM PROVIDED.

When the manufacturer of Product Approved side wall, horizontally vented, gas-fueled equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for the installation of the venting system design or the venting system components: and
2. A complete parts list for the venting system design or venting system.

MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED.

When the manufacturer of Product Approved sidewall, horizontally vented, gas-fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems," the following requirements shall be satisfied by the manufacturer:

1. The referenced "special venting system" instructions shall be included with the appliance or equipment installation instructions; and
2. The "special venting systems" shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

A copy of all installation instructions for all Product Approved side wall, horizontally vented, gas-fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.