INSTALLATION INSTRUCTIONS

80G2UH-V
Warm Air Gas Furnace
Upflow / Horizontal Left and Right Air Discharge

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

⚠️ WARNING
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.

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

Save these instructions for future reference

(P) 507335-02
### Unit Dimensions

**Front View**
- **A**: 14-1/2 (368) in. left, 17-1/2 (446) in. right
- **B**: 368 mm left, 446 mm right
- **C**: 13-3/8 (340) in. left, 16-3/8 (416) in. right
- **D**: 13 in. left, 16 in. right

**Side View**
- **A**: 21 in. (533 mm)
- **B**: 19-7/8 (504 mm)
- **C**: 19-1/2 (495 mm)
- **D**: 8 in. (203 mm)

**Top View**
- **A**: 3/4 (19) in.
- **B**: 9/16 (14) in.
- **C**: 5/8 (16) in.
- **D**: 3-1/4 (83) in.

**Table of Dimensions**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>070-12</td>
<td>14-1/2</td>
<td>368</td>
<td>13-3/8</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>in.</td>
<td>mm</td>
<td>in.</td>
<td>mm</td>
</tr>
<tr>
<td>090-16</td>
<td>17-1/2</td>
<td>446</td>
<td>16-3/8</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>in.</td>
<td>mm</td>
<td>in.</td>
<td>mm</td>
</tr>
<tr>
<td>110-20</td>
<td>21</td>
<td>533</td>
<td>19-7/8</td>
<td>19-1/2</td>
</tr>
<tr>
<td></td>
<td>in.</td>
<td>mm</td>
<td>in.</td>
<td>mm</td>
</tr>
</tbody>
</table>
Figure 1.
The 80G2UH-V gas furnace is shipped ready for installation in the upflow or horizontal position (left or right). The furnace is shipped with the bottom panel in place. The bottom panel must be removed if the unit is to be installed in a horizontal application. The panel may also be removed in upflow applications.

The furnace is equipped for installation in natural gas applications. A conversion kit (ordered separately) is required for use in propane/LP gas applications.

### Shipping and Packing List

1 - Assembled Gas Furnace  
1 - Bag assembly containing the following:  
  2 - Screws  
  3 - Wire nuts  
  1 - Snap bushing  
  1 - Snap Plug  
  1 - Wire tie  
  1 - Vent warning label  
  1 - Owner’s manual and warranty card

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.

### Clearances

Adequate clearance must be made around the air openings into the vestibule area. In order to ensure proper unit operation, combustion and ventilation air supply must be provided according to the current National Fuel Gas Code. Vent installations must be consistent with the venting tables (in this instruction) and applicable provisions of local building codes.

This furnace is CSA International certified for installation clearances to combustible material as listed on the unit nameplate and in the tables in Figure 8 and Figure 11. Installers should also consider the greater of either accessibility/service clearances or 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.

### Installed Locations

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.

### Temperature Rise

**NOTE:** Furnace must be adjusted to obtain a temperature rise (high and low fire) within the range(s) specified on the unit nameplate. Failure to do so may cause erratic limit operation and may result in premature heat exchanger failure.

This 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. See Figure 2. 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 2.
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 bulb for cases where a night setback thermostat is used. Return air temperature must not exceed 85°F (29°C) dry bulb.

This furnace may be installed in alcoves, closets, attics, basements, garages, and utility rooms in the upflow or horizontal position.

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

Use of Furnace as a Construction Heater
Units may be used for heating of buildings or structures under construction, if the following conditions are met to ensure proper operation.

DO NOT USE THE UNIT FOR CONSTRUCTION HEAT UNLESS ALL OF THE FOLLOWING CRITERIA ARE MET:

a. Furnace must be in its final location. The vent system must be permanently installed per these installation instructions.

b. Furnace must be installed as a two pipe system and one hundred percent (100%) outdoor air must be provided for combustion air requirements during construction.

c. A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is prohibited.

d. The input rate and temperature rise must be set per the furnace rating plate.

e. Supply and Return air ducts must be provided and sealed to the furnace. Return air must be terminated outside of the space where furnace is installed.

f. Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.

g. MERV 11 or greater air filters must be installed in the system and must be regularly inspected and maintained (e.g., regular static checks and replaced at end of life) during construction.

h. Blower and vestibule access panels must be in place on the furnace at all times.

i. The furnace heat exchanger, components, duct system, and evaporator coils must be thoroughly cleaned following final construction clean-up.

j. Air filters must be replaced upon construction completion.

k. All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified in accordance with these installation instructions.

EQUIPMENT MAY EXPERIENCE PREMATURE COMPONENT FAILURE AS A RESULT OF FAILURE TO FOLLOW THE ABOVE INSTALLATION INSTRUCTIONS. FAILURE TO FOLLOW THE ABOVE INSTALLATION INSTRUCTIONS VOIDS THE MANUFACTURER’S EQUIPMENT LIMITED WARRANTY. ALLIED AIR DISCLAIMS ALL LIABILITY IN CONNECTION WITH INSTALLER’S FAILURE TO FOLLOW THE ABOVE INSTALLATION INSTRUCTIONS.

NOTWITHSTANDING THE FOREGOING, INSTALLER IS RESPONSIBLE FOR CONFIRMING THAT THE USE OF CONSTRUCTION HEAT IS CONSISTENT WITH THE POLICIES AND CODES OF ALL REGULATING ENTITIES. ALL SUCH POLICIES AND CODES MUST BE ADHERED TO.

General

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 must 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.
• Do not install the furnace where drafts might blow directly into it. This could cause improper combustion.
• Do not block the furnace combustion air openings with clothing, boxes, doors, etc. Air is needed for proper combustion and safe unit operation.
• When the furnace is installed in an attic or other insulated space, keep insulation away from the furnace.

NOTE: The Commonwealth of Massachusetts stipulates these additional requirements:
• Gas furnaces shall be installed by a licensed plumber or fitter only.
• The gas cock must be “T handle” type.
• When a furnace is installed in an attic, the passageway to and service area surrounding the equipment shall be floored.

Combustion, Dilution & Ventilation Air

In the past, there was no problem in bringing in sufficient outdoor air for combustion. Infiltration provided all the air that was needed. In today’s homes, tight construction practices make it necessary to bring in air from outside for combustion. Take into account that exhaust fans, appliance vents, chimneys, and fireplaces force additional air that could be used for combustion out of the house. Unless outside air is brought into the house for combustion, negative pressure (outside pressure is greater than inside pressure) will build to the point that a downdraft can occur in the furnace vent pipe or chimney. As a result, combustion gases enter the living space creating a potentially dangerous situation.

In the absence of local codes concerning air for combustion and ventilation, use the guidelines and procedures in this section to install these furnaces to ensure efficient and safe operation. You must consider combustion air needs and requirements for exhaust vents and gas piping.

A portion of this information has been reprinted with permission from the National Fuel Gas Code (ANSI-Z223.1). This reprinted material is not the complete and official position of the ANSI on the referenced subject, which is represented only by the standard in its entirety.

All gas fired appliances require air for the combustion process. If sufficient combustion air is not available, the furnace or other appliances will operate inefficiently and unsafely. Enough air must be provided to meet the needs of all fuel burning appliances and appliances such as exhaust fans which force air out of the house. When fireplaces, exhaust fans, or clothes dryers are used at the same time as the furnace, much more air is necessary to ensure proper combustion and to prevent a downdraft. Insufficient air causes incomplete combustion which can result in carbon monoxide.

In addition to providing combustion air, fresh outdoor air dilutes contaminants in the indoor air. These contaminants may include bleaches, adhesives, detergents, solvents and other contaminants which can corrode furnace components.

WARNING
Insufficient combustion air can cause headaches, nausea, dizziness or asphyxiation. It will also cause excess water in the heat exchanger resulting in rusting and premature heat exchanger failure. Excessive exposure to contaminated combustion air will result in safety and performance related problems. Avoid exposure to the following substances in the combustion air supply:
• Permanent wave solutions
• Chlorinated waxes and cleaners
• Chlorine base swimming pool chemicals
• Water softening chemicals
• De-icing salts or chemicals
• Carbon tetrachloride
• Halogen type refrigerants
• Cleaning solvents (such as perchloroethylene)
• Printing inks, paint removers, varnishes, etc.
• Hydrochloric acid
• Cements and glues
• Antistatic fabric softeners for clothes dryers
• Masonry acid washing materials

The requirements for providing air for combustion and ventilation depend largely on whether the furnace is installed in an unconfined or a confined space.

Unconfined Space
An unconfined space is an area such as a basement or large equipment room with a volume greater than 50 cubic feet (1.42 m³) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This space also includes adjacent rooms which are not separated by a door. Though an area may appear to be unconfined, it might be necessary to bring in outdoor air for combustion if the structure does not provide enough air by infiltration. If the furnace is located in a building of tight construction with weather stripping and caulking around the windows and doors, follow the procedures in the air from outside section.
Confined Space
A confined space is an area with a volume less than 50 cubic feet (1.42 m³) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This definition includes furnace closets or small equipment rooms.

When the furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air must be handled by ducts which are sealed to the furnace casing and which terminate outside the space containing the furnace. This is especially important when the furnace is mounted on a platform in a confined space such as a closet or small equipment room. Even a small leak around the base of the unit at the platform or at the return air duct connection can cause a potentially dangerous negative pressure condition. Air for combustion and ventilation can be brought into the confined space either from inside the building or from outside.

Air from Inside
If the confined space that houses the furnace adjoins a space categorized as unconfined, air can be brought in by providing two permanent openings between the two spaces. Each opening must have a minimum free area of 1 square inch (645 mm²) per 1,000 Btu (.29 kW) per hour of total input rating of all gas fired equipment in the confined space. Each opening must be at least 100 square inches (64516 mm²). One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. See Figure 3.

Air from Outside
If air from outside is brought in for combustion and ventilation, the confined space must have two permanent openings. One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. These openings must communicate directly or by ducts with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors or indirectly through vertical ducts. Each opening shall have a minimum free area of 1 square inch (645 mm²) per 4,000 Btu (1.17 kW) per hour of total input rating of all equipment in the enclosure. See Figure 4 and Figure 5.

When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch (645 mm²) per 2,000 Btu (.56 kW) per total input rating of all equipment in the enclosure. See Figure 6.

When ducts are used, they shall be of the same cross sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be no less than 3 inches (75 mm). In calculating free area, the blocking effect of louvers, grilles, or screens must be considered. If the design and free area of protective covering is not known for calculating the size opening required, it may be assumed that wood louvers will have 20 to 25 percent free area and metal louvers and grilles will have 60 to 75 percent free area. Louvers and grilles must be fixed in the open position or interlocked with the equipment so that they are opened automatically during equipment operation.
**Figure 5. Equipment in Confined Space - All Air from Outside**

*All Air through Ventilated Attic*

**NOTE:** The inlet and outlet air openings shall each have a free area of at least one square inch per 4,000 Btu (645 mm² per 1.17 kW) per hour of the total input rating of all equipment in the enclosure.

**Figure 6. Equipment in Confined Space - All Air from Outside**

**NOTE:** Each air duct opening shall have a free area of at least one square inch per 2,000 Btu (645 mm² per .59 kW) per hour of the total input rating of all equipment in the enclosure. If the equipment room is located against an outside wall and the air openings communicate directly with the outdoors, each opening shall have a free area of at least 1 square inch per 4,000 Btu (645 mm² per 1.17 kW) per hour of the total input rating of all other equipment in the enclosure.

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**Setting Equipment**

**WARNING**

Do not install the furnace on its front or its back. 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.

The gas furnace can be installed as shipped in either the upflow position or the horizontal position.

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, and installation and service clearances [24 inches (610 mm) at unit front]. The unit must be level.

**NOTE:** Units with 1/2 hp blower motors are equipped with three flexible legs and one rigid leg. See Figure 7. 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.

**Upflow Applications**

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in Figure 8.
Figure 8. Upflow Application Installation Clearances

<table>
<thead>
<tr>
<th>Type of Vent Connector</th>
<th>Type C</th>
<th>Type B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>1 in. (25 mm)</td>
<td>1 in. (25 mm)</td>
</tr>
<tr>
<td>* Front</td>
<td>2-1/4 in. (57 mm)</td>
<td>2-1/4 in. (57 mm)</td>
</tr>
<tr>
<td>Back</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sides</td>
<td>0†</td>
<td>0</td>
</tr>
<tr>
<td>Vent</td>
<td>6 in. (152 mm)</td>
<td>1 in. (25 mm)</td>
</tr>
<tr>
<td>Floor</td>
<td>0‡</td>
<td>0‡</td>
</tr>
</tbody>
</table>

* Front clearance in alcove installation must be 24 in. (610 mm). Maintain a minimum of 24 in. (610 mm) for front service access.
‡ For installation on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.
† Left side requires 3 inches if a single wall vent is used on 14-1/2 inch cabinets.

Return Air - Upflow Applications
Return air can be brought in through the bottom or either side of the furnace installed in an upflow application. If the furnace is installed on a platform with bottom return, make an airtight seal between the bottom of the furnace and the platform to ensure that the furnace operates properly and safely. The furnace is equipped with a removable bottom panel to facilitate installation.

Markings are provided on both sides of the furnace cabinet for installations that require side return air. Cut the furnace cabinet at the maximum dimensions shown on Page 2.

**NOTE:** 20C and 20D units that require air volumes over 1800 cfm (850 L/s) must have one of the following:

1. Single side return air with transition to accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter. (Required to maintain proper air velocity.) See Figure 9.
2. Single side return air with optional return airbase. See Figure 12.
3. Bottom return air.
4. Return air from both sides.
5. Bottom and one side return air.

Figure 9. Single Side Return Air (with transition and filter)

Removing the Bottom Panel
Remove the two screws that secure the bottom cap to the furnace. Pivot the bottom cap down to release the bottom panel. Once the bottom panel has been removed, reinstall the bottom cap. See Figure 10.

Figure 10. Removing the Bottom Panel
Horizontal Applications

The furnace can be installed in horizontal applications. Order horizontal suspension kit (51W10) or use equivalent suspension method.

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in Figure 11.

This furnace may be installed in either an attic or a crawl space. Either suspend the furnace from roof rafters or floor joists, as shown in Figure 13, or install the furnace on a platform, as shown in Figure 14.

**NOTE:** Heavy gauge perforated sheet metal straps may be used to suspend the unit from roof rafters or ceiling joists. When straps are used to suspend the unit in this way, support must be provided for both the ends. The straps must not interfere with the plenum or exhaust piping installation. Cooling coils and supply and return air plenums must be supported separately.

**NOTE:** When the furnace is installed on a platform in a crawlspace, it must be elevated enough to avoid water damage and to allow the evaporator coil to drain.

Figure 11. Horizontal Application Installation Clearances

<table>
<thead>
<tr>
<th>Type of Vent Connector</th>
<th>Type C</th>
<th>Type B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>* Front</td>
<td>2-1/4 in. (57 mm)</td>
<td>2-1/4 in. (57 mm)</td>
</tr>
<tr>
<td>Back</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sides</td>
<td>2 in. (51 mm)</td>
<td>2 in. (51 mm)</td>
</tr>
<tr>
<td>Vent</td>
<td>6 in. (152 mm)</td>
<td>1 in. (25 mm)</td>
</tr>
<tr>
<td>Floor</td>
<td>0‡</td>
<td>0‡</td>
</tr>
</tbody>
</table>

* Front clearance in alcove installation must be 24 in. (610 mm). Maintain a minimum of 21 in. (610 mm) for front service access.

‡ For installations on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.

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Figure 12. Optional Return Air Base

(Upflow Applications Only - For use with A, B, C and D cabinets)

**NOTE:** Optional Side Return Air Filter Kits are not for use with Return Air Base.

1 Both the unit return air opening and the base return air opening must be covered by a single plenum or IAQ cabinet.

Minimum unit side return air opening dimensions for units requiring 1800 cfm or more of air (W x H): 23 x 11 in. (584 x 279 mm).

The opening can be cut as needed to accommodate plenum or IAQ cabinet while maintaining dimensions shown.

Side return air openings must be cut in the field. There are cutting guides stenciled on the cabinet for the side return air opening.

The size of the opening must not extend beyond the markings on the furnace cabinet.

² To minimize pressure drop, the largest opening height possible (up to 14 inches) is preferred.
Return Air - Horizontal Applications

Return air must be brought in through the end of a furnace installed in a horizontal application. The furnace is equipped with a removable bottom panel to facilitate installation. See Figure 10.

**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 the living space. Use screws and joint tape to seal the return air system to the furnace.

In platform installations with bottom return air, 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..

The return and supply air duct systems must never 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.

**Filters**

This unit is not equipped with a filter or rack. A field provided high velocity filter is required for the unit to operate properly. Table 1 lists recommended filter sizes.

A filter must be in place any time the unit is operating.

<table>
<thead>
<tr>
<th>Furnace Cabinet Width</th>
<th>Filter Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Side Return</td>
</tr>
<tr>
<td>14-1/2&quot;</td>
<td>16 x 25 x 1 (1)</td>
</tr>
<tr>
<td>17-1/2&quot;</td>
<td>16 x 25 x 1 (1)</td>
</tr>
<tr>
<td>21&quot;</td>
<td>20 x 25 x 1 (1)</td>
</tr>
</tbody>
</table>

**Duct System**

Use industry approved standards (such as those published by Air Conditioning Contractors of America or American Society of Heating, Refrigerating and Air Conditioning Engineers) 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:** Do not operate the furnace in the heating mode with an external static pressure that exceeds 0.8 inches w.c. Higher external static pressures may cause erratic limit operation.
Supply Air Plenum
If the furnace is installed without a cooling coil, a removable access panel must be installed in the supply air duct. The access panel should be large enough to permit inspection (either by smoke or reflected light) of the heat exchanger for leaks after the furnace is installed. The furnace access panel must always be in place when the furnace is operating and it must not allow leaks into the supply air duct system.

Return Air Plenum
NOTE: Return air must not be drawn from a room where this furnace, or any other gas fueled appliance (i.e., water heater), or carbon monoxide producing device (i.e., 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.

In upflow applications, the return air can be brought in through the bottom or either side of the furnace. If a furnace with bottom return air is installed on a platform, make an airtight seal between the bottom of the furnace and the platform to ensure that the unit operates properly and safely. 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.

Venting
A 4 inch diameter flue transition is factory installed on the combustion air inducer outlet of all models. Figure 16 shows the combustion air inducer as shipped from the factory.

Figure 16. Upflow Position  
Top Vent Discharge

**WARNING**

The unit will not vent properly with the flue transition pointed down in the 6 o’clock position.

The combustion air inducer may be rotated clockwise or counterclockwise by 90° to allow for top or side vent discharge in all applications. When the unit is installed, the flue transition must be in the 9 o’clock, 12 o’clock or 3 o’clock position.

If necessary reposition the combustion air inducer, pressure switch and/or make-up box as needed per the following steps. See Figure 16 through Figure 22.

1. Remove the four mounting screws (Figure 15) which secure the combustion air inducer / pressure switch assembly to the orifice plate. Lift the assembly and rotate it 90° clockwise or counter clockwise to either the 3 o’clock position or 9 o’clock position. Resecure with four screws. Gasket should be left in place.

2. Use tin snips to cut preferred opening on the cabinet for repositioning the flue outlet. Use the cut-out piece as a cover plate to patch unused opening on cabinet.
• Remove make-up box assembly (2 screws) and cut wire tie to free make-up box wires. Reinstall make-up box on other side of cabinet.

• Resecure make-up box wires: Either pull excess wires through the blower compartment and secure using supplied wire tie, or coil excess wire and secure to the gas manifold.

**Figure 17. Upflow Position**
Left Side Vent Discharge

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• Pressure switch tubing may be too long. Cut to fit, then reattach to barbed fitting on pressure switch. Tubing must not be allowed to sag.

**Figure 18. Upflow Position**
Right Side Vent Discharge

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• Disconnect pressure switch hose from barbed fitting on the pressure switch assembly. Remove pressure switch assembly (1 screw) and cut wire tie to free pressure switch wires. Reinstall pressure switch on the other side of orifice plate and reconnect pressure switch hose.

• Resecure pressure switch wires: Either pull excess wires through the blower compartment and secure using supplied wire tie, or coil excess wire and secure to the gas manifold.

**Figure 19. Horizontal Left Position**
Top Vent Discharge

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**Figure 20. Horizontal Left Position**
Side Vent Discharge
• Remove make-up box assembly (2 screws) and cut wire tie to free make-up box wires. Reinstall make-up box on other side of cabinet.

• Resecure make-up box wires: Either pull excess wires through the blower compartment and secure using supplied wire tie, or coil excess wire and secure to the gas manifold.

These series units are classified as fan assisted Category I furnaces when vertically vented according to the latest edition of National Fuel Gas Code (NFPA 54 / ANSI Z223.1) in the USA. A fan assisted Category I furnace is an appliance equipped with an integral mechanical means to either draw or force combustion products through the combustion chamber and/or heat exchanger. This unit is not approved for use with horizontal venting.

NOTE: Use these instructions as a guide. They do not supersede local codes. This furnace must be vented according to all local codes, these installation instructions, and the provided venting tables in these instructions.

The venting tables in this manual were extracted from the National Fuel Gas Code (NFPA 54 / ANSI Z223.1) and are provided as a guide for proper vent installation. Proper application, termination, construction and location of vents must conform to local codes having jurisdiction. In the absence of local codes, the NFGC serves as the defining document.

Refer to the tables and the venting information contained in these instructions to properly size and install the venting system.

**IMPORTANT**

Once the venting system is installed, attach the "Disconnected Vent" warning sticker to a visible area of the plenum near the vent pipe. See Figure 23. The warning sticker is provided in the bag assembly. Order kit 66W04 for additional stickers.

**WARNING**

Asphyxiation hazard. The exhaust vent for this furnace must be securely connected to the furnace flue transition at all times.

Use self drilling sheet metal screws or a mechanical fastener to firmly secure the vent pipe to the round collar of the flue transition. If self drilling screws are used to attach the vent pipe, it is recommended that three be used. Drive one self drilling screw through the front and one through each side of the vent pipe and collar. See Figure 23.

Install the first vent connector elbow at a minimum of six inches (152 mm) from the furnace vent outlet. See Figure 23.

**Venting Using a Masonry Chimney**

The following additional requirements apply when a lined masonry chimney is used to vent this furnace.
Masonry chimneys used to vent Category I central furnaces must be either tile lined or lined with a listed metal lining system or dedicated gas vent. Unlined masonry chimneys are prohibited. See Figure 24 and Figure 25 for common venting.

A chimney with one or more sides exposed to the outside of the structure is considered to be an exterior chimney. An exterior masonry chimney that is not tile lined must be lined with B1 vent or a listed insulated flexible metal vent. An exterior tile lined chimney that is sealed and capped may be lined with a listed uninsulated flexible metal vent.

If the existing chimney will not accommodate a listed metal liner, either the chimney must be rebuilt to accommodate one of these liners or an alternate approved venting method must be found.

Insulation for the flexible vent pipe must be an encapsulated fiberglass sleeve recommended by the flexible vent pipe manufacturer. See Figure 24.

**DO NOT** insulate the space between the liner and the chimney wall with puffed mica or any other loose granular insulating material.

![Figure 24. Common Venting Using Metal-Lined Masonry Chimney](image)

**NOTE 1:** Refer to the provided venting tables for installations. Refer to the capacity requirements shown in the provided venting tables.

**IMPORTANT**

SINGLE appliance venting of a fan assisted furnace into a tile lined masonry chimney (interior or outside wall) is prohibited. The chimney must first be lined with either type B1 vent or an insulated single wall flexible vent lining system which has been sized according to the provided venting tables and the vent pipe manufacturer’s instructions.

A fan assisted furnace may be commonly vented into an existing lined masonry chimney if the following conditions are met:

- The chimney is currently serving at least one draft hood equipped appliance.
- The vent connectors and chimney are sized according to the provided venting tables.

If type B1 double wall vent is used inside a chimney, no other appliance can be vented into the chimney. The outer wall of type B1 vent pipe must not be exposed to flue products. A type B1 vent or masonry chimney liner shall terminate above the roof surface with a listed cap or a listed roof assembly according to the terms of their respective listings and the vent manufacturer’s instructions.

When inspection reveals that an existing chimney is not safe for the intended purpose, it shall be rebuilt to conform to nationally recognized standards, lined or relined with suitable materials, or replaced with a gas vent or chimney suitable for venting. The chimney passageway must be checked periodically to ensure that it is clear and free of obstructions.

Do not install a manual damper, barometric draft regulator, or flue restrictor between the furnace and the chimney.

![Figure 25. Common Venting Using Tile Lined Interior Masonry Chimney and Combined Vent Connector](image)

**NOTE:** Refer to provided venting tables for installations.

**NOTE:** The chimney must be properly sized per provided venting tables or lined with listed metal lining system.
Never connect a Category I appliance to a chimney that is servicing a solid fuel appliance. If a fireplace chimney flue is used to vent this appliance, the fireplace opening must be permanently sealed.

A type B or listed chimney lining system that passes through an unused masonry chimney flue is not considered to be exposed to the outdoors.

**General Venting Requirements**

Vent these furnaces according to these instructions:

3. Vent diameter recommendations and maximum allowable piping runs are found in the provided venting tables.

4. In no case should the vent or vent connector diameter be less than the diameter specified in the provided venting tables.

5. The minimum vent capacity determined by the sizing tables must be less than the low fire input rating and the maximum vent capacity must be greater than the high fire input rating.

6. Single appliance vents - If the vertical vent or tile lined chimney has a larger diameter or flow area than the vent connector, use the vertical vent diameter to determine the minimum vent capacity and the vent connector diameter to determine the maximum vent capacity. The flow area of the vertical vent, however, shall not exceed 7 times the flow area of the listed appliance categorized vent area, drafthood outlet area or flue collar area unless designed according to approved engineering methods.

7. Multiple appliance vents - The flow area of the largest section of vertical vent or chimney shall not exceed 7 times the smallest listed appliance categorized vent area, drafthood outlet area or flue collar area unless designed according to approved engineering methods.

8. The entire length of single wall metal vent connector shall be readily accessible for inspection, cleaning, and replacement.

9. Single appliance venting configurations with zero lateral lengths (Table 3 and Table 4) are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10% (0.90 x maximum listed capacity).

10. The common venting Tables (5, 6, 7, and 8) were generated using a maximum horizontal vent connector length of 1-1/2 feet (.46 m) for each inch (25 mm) of connector diameter as follows:

<table>
<thead>
<tr>
<th>Connector Diameter</th>
<th>Maximum Horizontal Connector Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. (mm)</td>
<td>ft. (m)</td>
</tr>
<tr>
<td>3 (76)</td>
<td>4-1/2 (1.37)</td>
</tr>
<tr>
<td>4 (102)</td>
<td>6 (1.83)</td>
</tr>
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<td>5 (127)</td>
<td>7-1/2 (2.29)</td>
</tr>
<tr>
<td>6 (152)</td>
<td>9 (2.74)</td>
</tr>
<tr>
<td>7 (178)</td>
<td>10-1/2 (3.20)</td>
</tr>
</tbody>
</table>

11. If the common vertical vent is offset, the maximum common vent capacity listed in the common venting tables should be reduced by 20%, the equivalent of two 90° elbows (0.80 x maximum common vent capacity). The horizontal length of the offset shall not exceed 1-1/2 feet (.46 m) for each inch (25 mm) of common vent diameter.

12. The vent pipe should be as short as possible with the least number of elbows and angles required to complete the job. Route the vent connector to the vent using the shortest possible route.

13. A vent connector shall be supported without any dips or sags and shall slope a minimum of 1/4 inch (6.4 mm) per linear foot (305 mm) of connector, back toward the appliance.

14. Vent connectors shall be firmly attached to the furnace flue collar by self-drilling screws or other approved means, except vent connectors of listed type B vent material which shall be assembled according to the manufacturer’s instructions. Joints between sections of single wall connector piping shall be fastened by screws or other approved means.

15. When the vent connector used for Category I appliances must be located in or pass through a crawl space, attic or other areas which may be cold, that portion of the vent connector shall be constructed of listed double wall type B vent material or material having equivalent insulation qualities.

16. All venting pipe passing through floors, walls, and ceilings must be installed with the listed clearance to combustible materials and be fire stopped according to local codes. In absence of local codes, refer to NFGC (2223.1).

17. No portion of the venting system can extend into, or pass through any circulation air duct or plenum.

18. Vent connectors serving Category I appliances shall not be connected to any portion of mechanical draft systems operating under positive pressure such as Category III or IV venting systems.

19. If vent connectors are combined prior to entering the common vent, the maximum common vent capacity listed in the common venting tables must be reduced by 10%, the equivalent of one 90° elbow (0.90 x maximum common vent capacity).
20. The common vent diameter must always be at least as large as the largest vent connector diameter.

21. In no case, shall the vent connector be sized more than two consecutive table size diameters over the size of the draft hood outlet or flue collar outlet.

22. Do not install a manual damper, barometric draft regulator or flue restrictor between the furnace and the chimney.

23. When connecting this appliance to an existing dedicated or common venting system, you must inspect the venting system’s general condition and look for signs of corrosion. The existing vent pipe size must conform to these instructions and the provided venting tables. If the existing venting system does not meet these requirements, it must be resized.

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.

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 burners have 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 2223.1.)

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.
# Capacity of Type B Double Wall Vents with Type B Double Wall Connectors Serving a Single Category I Appliance

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<th>MIN</th>
<th>MAX</th>
<th>MIN</th>
<th>MAX</th>
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<td>Appliance Input Rating in Thousands of Btu per Hour</td>
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**NOTE:** Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).
## Capacity of Type B Double Wall Vents with Single Wall Metal Connectors Serving a Single Category I Appliance

<table>
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</tr>
<tr>
<td></td>
<td>5</td>
<td>50</td>
<td>68</td>
<td>73</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>NR</td>
<td>NR</td>
<td>93</td>
<td>129</td>
</tr>
<tr>
<td>30</td>
<td>0</td>
<td>34</td>
<td>99</td>
<td>53</td>
<td>211</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>37</td>
<td>80</td>
<td>55</td>
<td>164</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>49</td>
<td>74</td>
<td>72</td>
<td>157</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>NR</td>
<td>NR</td>
<td>91</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>NR</td>
<td>NR</td>
<td>115</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>NR</td>
<td>NR</td>
<td>181</td>
<td>223</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
</tbody>
</table>

**NOTE:** Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

Table 4.
### Vent Connector Capacity

**Type B Double Wall Vents with Type B Double Wall Connectors Serving Two or More Category I Appliances**

<table>
<thead>
<tr>
<th>Vent Height H (feet)</th>
<th>Connector Rise R (feet)</th>
<th>Vent and Connector Diameter - D (inches)</th>
<th>Appliance Input Rating in Thousands of Btu per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3 inch</td>
<td>4 inch</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>22</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>23</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>24</td>
<td>44</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>22</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>23</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>24</td>
<td>47</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>22</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>23</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>24</td>
<td>50</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>21</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>22</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>24</td>
<td>55</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>21</td>
<td>54</td>
</tr>
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<td></td>
<td>2</td>
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<td>57</td>
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<tr>
<td>30</td>
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<td>20</td>
<td>62</td>
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<tr>
<td></td>
<td>2</td>
<td>21</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>22</td>
<td>66</td>
</tr>
</tbody>
</table>

Table 5.

### Common Vent Capacity

**Type B Double Wall Vents with Type B Double Wall Connectors Serving Two or More Category I Appliances**

<table>
<thead>
<tr>
<th>Vent Height H (feet)</th>
<th>Common Vent Diameter</th>
<th>Appliance Input Rating in Thousands of Btu per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 inch</td>
<td>5 inch</td>
</tr>
<tr>
<td>6</td>
<td>92</td>
<td>81</td>
</tr>
<tr>
<td>8</td>
<td>101</td>
<td>90</td>
</tr>
<tr>
<td>10</td>
<td>110</td>
<td>97</td>
</tr>
<tr>
<td>15</td>
<td>125</td>
<td>112</td>
</tr>
<tr>
<td>20</td>
<td>136</td>
<td>123</td>
</tr>
<tr>
<td>30</td>
<td>152</td>
<td>138</td>
</tr>
</tbody>
</table>

Table 6.
### Vent Connector Capacity

Type B Double Wall Vents with Single Wall Metal Connectors Serving Two or More Category I Appliances

**Table 7.**

<table>
<thead>
<tr>
<th>Vent Height H (feet)</th>
<th>Lateral L (feet)</th>
<th>Vent and Connector Diameter - D (inches)</th>
<th>3 inch</th>
<th>4 inch</th>
<th>5 inch</th>
<th>6 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Appliance Input Rating in Thousands of Btu per Hour</td>
<td>MIN</td>
<td>MAX</td>
<td>MIN</td>
<td>MAX</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>121</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>130</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
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<tr>
<td></td>
<td>2</td>
<td>NR</td>
<td>84</td>
<td>85</td>
<td>124</td>
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<tr>
<td></td>
<td>3</td>
<td>NR</td>
<td>89</td>
<td>91</td>
<td>129</td>
<td>144</td>
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<tr>
<td>15</td>
<td>1</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
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<td>87</td>
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<td>2</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>83</td>
<td>94</td>
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<tr>
<td></td>
<td>3</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>87</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>49</td>
<td>56</td>
<td>78</td>
<td>97</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>52</td>
<td>59</td>
<td>82</td>
<td>103</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>55</td>
<td>62</td>
<td>87</td>
<td>107</td>
<td>125</td>
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<tr>
<td>30</td>
<td>1</td>
<td>47</td>
<td>60</td>
<td>77</td>
<td>110</td>
<td>112</td>
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<tr>
<td></td>
<td>2</td>
<td>51</td>
<td>62</td>
<td>81</td>
<td>115</td>
<td>117</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>54</td>
<td>64</td>
<td>85</td>
<td>119</td>
<td>122</td>
</tr>
</tbody>
</table>

**NOTE:** Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example, two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

### Common Vent Capacity

Type B Double Wall Vents with Single Wall Metal Connectors Serving Two or More Category I Appliances

**Table 8.**

<table>
<thead>
<tr>
<th>Vent Height H (feet)</th>
<th>Common Vent Diameter</th>
<th>Appliance Input Rating in Thousands of Btu per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 inch</td>
<td>5 inch</td>
</tr>
<tr>
<td></td>
<td>FAN + FAN</td>
<td>FAN + NAT</td>
</tr>
<tr>
<td>6</td>
<td>NA</td>
<td>78</td>
</tr>
<tr>
<td>8</td>
<td>NA</td>
<td>87</td>
</tr>
<tr>
<td>10</td>
<td>NA</td>
<td>94</td>
</tr>
<tr>
<td>15</td>
<td>121</td>
<td>108</td>
</tr>
<tr>
<td>20</td>
<td>131</td>
<td>118</td>
</tr>
<tr>
<td>30</td>
<td>145</td>
<td>132</td>
</tr>
</tbody>
</table>
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. The flexible connector can then be added between the black iron pipe and the gas supply line.

**CAUTION**

Gas Supply
1. This unit is shipped standard for left or right side installation of gas piping (or top entry in horizontal applications). Connect the gas supply to the piping assembly.
2. When connecting the gas supply piping, consider factors such as length of run, number of fittings, and furnace rating to avoid excessive pressure drop. Table 9 lists recommended pipe sizes for typical applications.
3. The gas piping must not run in or through air ducts, clothes chutes, gas vents or chimneys, dumb waiters, or elevator shafts.

**CAUTION**

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

**IMPORTANT**

NOTE: If emergency shutoff is necessary, shut off the main manual gas valve and disconnect main power to the furnace. The installer should properly label these devices.

### Gas Pipe Capacity - ft³/hr (m³/hr)

<table>
<thead>
<tr>
<th>Nominal Iron Pipe Size inches (mm)</th>
<th>Internal Diameter inches (mm)</th>
<th>10 (3.048)</th>
<th>20 (6.096)</th>
<th>30 (9.144)</th>
<th>40 (12.192)</th>
<th>50 (15.240)</th>
<th>60 (18.288)</th>
<th>70 (21.336)</th>
<th>80 (24.384)</th>
<th>90 (27.432)</th>
<th>100 (30.480)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 (12.7)</td>
<td>.622 (17.799)</td>
<td>175</td>
<td>120</td>
<td>97</td>
<td>82</td>
<td>73</td>
<td>66</td>
<td>61</td>
<td>57</td>
<td>53</td>
<td>50</td>
</tr>
<tr>
<td>3/4 (19.05)</td>
<td>.824 (20.930)</td>
<td>360</td>
<td>250</td>
<td>200</td>
<td>170</td>
<td>151</td>
<td>138</td>
<td>125</td>
<td>118</td>
<td>110</td>
<td>103</td>
</tr>
<tr>
<td>1 (25.4)</td>
<td>1.049 (26.645)</td>
<td>680</td>
<td>465</td>
<td>375</td>
<td>320</td>
<td>285</td>
<td>260</td>
<td>240</td>
<td>220</td>
<td>205</td>
<td>195</td>
</tr>
<tr>
<td>1-1/4 (31.75)</td>
<td>1.380 (35.052)</td>
<td>1400</td>
<td>1000</td>
<td>770</td>
<td>600</td>
<td>530</td>
<td>490</td>
<td>460</td>
<td>430</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>1-1/2 (38.1)</td>
<td>1.610 (40.894)</td>
<td>2100</td>
<td>1460</td>
<td>1180</td>
<td>990</td>
<td>810</td>
<td>750</td>
<td>690</td>
<td>650</td>
<td>620</td>
<td>620</td>
</tr>
<tr>
<td>3 (76.2)</td>
<td>3.068 (77.927)</td>
<td>11000</td>
<td>7700</td>
<td>6250</td>
<td>5300</td>
<td>4750</td>
<td>4300</td>
<td>3900</td>
<td>3700</td>
<td>3450</td>
<td>3250</td>
</tr>
</tbody>
</table>

**Note:** Capacity given in cubic feet (m³) of gas per hour and based on 0.60 specific gravity gas.

Table 9.
Figure 26. Upflow Applications
Possible Gas Piping Configurations

Figure 27. Horizontal Applications
Possible Gas Piping Configurations

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

NOTE: If emergency shutoff is necessary, shut off the main manual gas valve and disconnect the main power to the furnace. The installer should properly label these devices.

CAUTION
Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.

The furnace must be isolated by closing its individual manual shut-off valve and disconnecting from the gas supply system 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.).

IMPORTANT
When testing pressure of gas lines, 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, 14 inches w.c.).

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.

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. The excess wire must be pulled into the blower compartment. Secure the excess wire to the existing harness to protect it from damage.

Figure 28.

Figure 29. Interior Make-Up Box Installation

Figure 30. Interior Make-Up Box Installation
Refer to Figure 44 for schematic wiring diagram and troubleshooting and Figure 43 for field wiring.

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. Maximum over current protection allowed is shown in 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.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Maximum Over-Current Protection (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>070AV12</td>
<td>15</td>
</tr>
<tr>
<td>090BV16, 110CV20</td>
<td>20</td>
</tr>
</tbody>
</table>

**Table 10.**

4. Before connecting the thermostat, check to make sure the wires will be long enough for servicing at a later date. Make sure that thermostat wire is long enough to facilitate future removal of blower for service.

5. Complete the wiring connections to the equipment. Use the provided unit wiring diagram and the field wiring diagram shown in Figure 43. 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). A green ground wire is provided in the field make-up box.

   **NOTE:** This furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

7. One line voltage “ACC” 1/4” spade terminal is provided on the furnace integrated control. Any electronic air cleaner or other accessory 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 43 for control configuration. 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 43 for control configuration. This terminal is energized in the heating mode whenever the combustion air inducer is operating.

9. Install the room thermostat according to the instructions provided with the thermostat. If the furnace is being matched with a heat pump, refer to the instruction packaged with the dual fuel thermostat.

**Indoor Blower Speeds**

1. When the thermostat is set to “FAN ON,” the indoor blower will run continuously at approximately 50% of the second stage cooling speed when there is no cooling or heating demand. See Table 12 for allowable continuous circulation speeds.

2. When this unit is running in the heating mode, the indoor blower will run on the heating speed designated by the positions of DIP switches 1 (A,B,C,D) of the HEAT jumper plug.

3. When there is a cooling demand, the indoor blower will run on the cooling speed designated by the positions of DIP switches (A, B, C, D) of the COOL jumper plug.

**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.

**Electrical Wiring**

**WARNING**

Risk of electrical shock. Disconnect electrical power at the circuit breaker or service panel before making electrical connections. Failure to disconnect power supplies can result in property damage, personal injury, or death.

The furnace must be grounded and wired in accordance with local codes or, in the absence of local codes, with the National Electrical Code ANSI/NFPA No. 70 (latest edition) and/or CSA C22.1 Electrical Code (latest edition) if an external electrical source is utilized.

In all instances, other than wiring for the thermostat, the wiring to be done and any replacement of wire shall conform with the temperature limitation for Type T wire –63°F (35°C) rise.
Connect a sufficiently sized wire with ground to the furnace’s line voltage connections and ground wire. Refer to the furnace rating plate for electrical characteristics to be used in sizing field supply wiring and overcurrent protection.

The line voltage supply should be routed through a readily accessible disconnect located within sight of the furnace. A junction box on the furnace side panel is provided for line voltage connections. Refer to the furnace wiring diagram for specific connection information.

Proper polarity of the supply connections (“HOT” and “NEUTRAL”) must be observed to ensure that safety controls provide the protection intended.

A connection to the unit’s ground wire and actual earth ground (typically a ground stake or buried steel pipe) must be maintained for proper operation.

**Thermostat**
Install a room thermostat according to the instructions furnished with it. Select a location on an inside wall that is not subject to drafts, direct sunshine, or other heat sources. The initial heat anticipator setting should be equal to the total current draw of the control circuit. Low voltage thermostat connections are to be made to the integrated ignition/blower control board as indicated on the wiring diagram.

**Single Stage Thermostat Operation (80G2UH-V)**
The automatic heat staging option allows a single stage thermostat to be used with two stage furnace models (80G2UH-V). To activate this option, move the jumper pin (see Figure 31) to desired setting (5 minutes or 10 minutes). The furnace will start on 1st stage heat and stay at 1st stage heat for the duration of the selected time before switching to 2nd stage heat.

W1 on the control board must be connected to W1 on the thermostat.

**Humidifier**
Terminals are provided on the integrated ignition/blower control board for connection to a 120-volt humidifier. The “HUM” terminal is energized whenever the thermostat calls for heat. See the furnace wiring diagram for specific connection information.

**Electronic Air Cleaner**
Terminals are provided on the integrated ignition/blower control board for connection of a 120-volt electronic air cleaner. The “EAC” terminal is energized whenever the thermostat calls for heat, cooling, or continuous blower. See furnace wiring diagram for specific connection information.

**Variable Speed Features**
This furnace is equipped with a variable speed circulation air blower motor that will deliver a constant airflow within a wide range of external static pressures. Other features of this variable speed motor include:

**Soft Start**
The variable speed motor will slowly ramp up to normal operating speed. This minimizes noise and increases comfort by eliminating the initial blasts of air encountered with standard motors.

**Soft Stop**
At the end of a cooling or heating cycle, the variable speed motor will slowly ramp down after a short blower “off” delay. If continuous blower operation has been selected, the variable speed motor will slowly ramp down until it reaches the airflow for that mode.

**Passive and Active Dehumidification**

**Passive Dehumidification**
For situations where humidity control is a problem, a dehumidification feature has been built into the variable speed motor. At the start of each cooling cycle, the variable speed motor will run at 82% of the rated airflow for 7.5 minutes. After 7.5 minutes has elapsed, the motor will increase to 100% of the rated airflow.

**Active Dehumidification**
To achieve additional dehumidification, clip the jumper wire located below the DEHUM terminal on the integrated ignition/blower control board and connect a humidity control that opens on humidity rise to the DEHUM and R terminals. The DEHUM terminal on the control board must be connected to the normally closed contact of the humidity control so that the board senses an open circuit on high humidity. In this setup, the variable speed motor will operate at a 18% reduction in the normal cooling airflow rate when there is a call for dehumidification.

Both the passive and active dehumidification methods described above can be utilized on the same furnace.
Circulating Airflow Adjustments

**Cooling Mode**

The units are factory set for the highest airflow for each model. Adjustments can be made to the cooling airflow by repositioning the jumper plug marked COOL – A, B, C, D (see Figure 32) based on the information found in the Adjusting Airflow tables. To determine what CFM the motor is delivering at any time, count the number of times the amber LED on the control board flashes. Each flash signifies 100 CFM; count the flashes and multiply by 100 to determine the actual CFM delivered (for example: 10 flashes x 100 = 1000 CFM).

**Heating Mode**

These units are factory set to run at the middle of the heating rise range as shown on the unit rating plate. If higher or lower rise is desired, reposition the jumper plug marked HEAT - A, B, C, D (see Figure 32) based on the information found in the Adjusting Airflow tables. To determine what CFM the motor is delivering at any time, count the number of times the amber LED on the control board flashes. Each flash signifies 100 CFM; count the flashes and multiply by 100 to determine the actual CFM delivered (for example: 10 flashes x 100 = 1000 CFM).

**Adjust Tap**

Airflow amounts may be increased or decreased by 10% by moving the ADJUST jumper plug (see Figure 32) from the NORM position to the (+) or (-) position. Changes to the ADJUST tap will affect both cooling and heating airflows. The TEST position on the ADJUST tap is not used.

Continuous Blower Operation

The comfort level of the living space can be enhanced when using this feature by allowing continuous circulation of air between calls for cooling or heating. The circulation of air occurs at half the full cooling airflow rate.

To engage the continuous blower operation, place the fan switch on the thermostat into the ON position. A call for fan from the thermostat closes R to G on the ignition control board. The control waits for a 1 second thermostat debounce delay before responding to the call for fan by ramping the circulating blower up to 50% of the cooling speed. When the call for continuous fan is satisfied, the control immediately ramps down the circulating blower.

![Figure 32. ADJUST, HEAT, and COOL Taps on Integrated Ignition/Blower Control Board](image)
## Adjusting Airflow

### Bottom Return Air

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<tbody>
<tr>
<td>80G2UH070AV12</td>
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<td>Norm</td>
<td>715</td>
<td>900</td>
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<td>1105</td>
<td>1225</td>
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<td></td>
<td></td>
<td>1st</td>
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<td>1271</td>
<td>600</td>
<td>810</td>
<td>960</td>
<td>1090</td>
</tr>
</tbody>
</table>

* Speed Adjustment (+) or (-) 10% by moving jumper from NORM.

### Bottom Return Air, Return Air from Both Sides or Return Air from Bottom and One Side

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<td>1401</td>
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<td></td>
<td></td>
<td>1st</td>
<td>Norm</td>
<td>1178</td>
<td>1301</td>
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<td>1410</td>
<td>969</td>
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</table>

* Speed Adjustment (+) or (-) 10% by moving jumper from NORM.

### Single Side Return Air

<table>
<thead>
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* Speed Adjustment (+) or (-) 10% by moving jumper from NORM.

### Side Return with Optional Return Air Base

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<td>n/a</td>
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<td></td>
<td>1st</td>
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* Speed Adjustment (+) or (-) 10% by moving jumper from NORM.
### Allowable Heating Speeds

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<th>Model</th>
<th>Speed Adjust</th>
<th>Setting &quot;D&quot;</th>
<th>Setting &quot;C&quot;</th>
<th>Setting &quot;B&quot;</th>
<th>Setting &quot;A&quot;</th>
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<tr>
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<td>Allowed</td>
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</tr>
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<td></td>
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<td>Allowed</td>
<td>Factory Setting</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>-10%</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
</tr>
<tr>
<td>80G2UH090BV16</td>
<td>+10%</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Not Allowed</td>
</tr>
<tr>
<td></td>
<td>Norm</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Factory Setting</td>
<td>Not Allowed</td>
</tr>
<tr>
<td></td>
<td>-10%</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Allowed</td>
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</tr>
<tr>
<td>80G2UH110CV20</td>
<td>+10%</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Factory Setting</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>Norm</td>
<td>Allowed</td>
<td>Allowed</td>
<td>Factory Setting</td>
<td>Allowed</td>
</tr>
<tr>
<td></td>
<td>-10%</td>
<td>Allowed</td>
<td>Allowed</td>
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<td>Allowed</td>
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Table 11.

### Allowable Circulation Speeds

<table>
<thead>
<tr>
<th>Model</th>
<th>38% of Second Stage Cooling</th>
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<tbody>
<tr>
<td>All Models</td>
<td>Factory Setting</td>
</tr>
</tbody>
</table>

Table 12.

---

### Start-Up

#### For Your Safety, Read Before Operating

**WARNING**

Do not use this furnace if any part has been under water. Immediately call a licensed professional service technician (or equivalent) to inspect the furnace and to replace any part of the control system and any gas control which has been under water.

**WARNING**

If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off 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.

**WARNING**

BEFORE LIGHTING smell all around the appliance 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 this unit is equipped with a gas control switch. Use only your hand to move the switch. Never use tools. If the switch will not turn or if the control switch will not move by hand, do not try to repair it.

**Placing the Furnace into Operation**

These units are equipped with an automatic ignition system. Do not attempt to manually light burners on these furnaces. 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 an automatic ignition system.

**WARNING**

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.
Gas Valve Operation
See Figure 33 and Figure 34

1. **STOP!** Read the safety information at the beginning of this section.
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 heating compartment access panel.
6. Move gas valve switch to OFF position. Do not force. See Figure 33 and Figure 34.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions. If you do not smell gas go to next step.

![Figure 33. White Rodgers Gas Valve](image)

8. Move gas valve switch to ON position. Do not force. See Figure 33 and Figure 34.
9. Replace the heating compartment 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 your service technician or gas supplier.

Turning Off Gas to Unit
1. Set the thermostat to the lowest setting.
2. Turn off all electrical power to the unit if service is to be performed.
3. Remove the heating compartment access panel.
4. Move gas valve switch to OFF position. Do not force. See Figure 33 and Figure 34.
5. Replace the upper 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 or tripped circuit breaker?
5. Is the filter dirty or plugged? Dirty or plugged filters will cause the limit control 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 internal manual shut-off valve open?
9. Is the unit ignition system in lock out? If the unit locks out again, call the service technician to inspect the unit for blockages.
10. Is pressure switch closed? Obstructed flue will cause unit to shut off at pressure switch. Check flue and outlet for blockages.
11. Are flame rollout switches tripped? If flame rollout switches are tripped, call the service technician for inspection.

Gas Pressure Adjustment
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 13. If manifold pressure matches Table 15 and rate is incorrect, check gas orifices for proper size and restriction. Remove temporary gas meter if installed.

**NOTE:** Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.
### Capacity Gas

<table>
<thead>
<tr>
<th>Orifice Size</th>
<th>Natural</th>
<th>LP</th>
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</thead>
<tbody>
<tr>
<td>0 - 7500 ft.</td>
<td>.063</td>
<td>.034</td>
</tr>
<tr>
<td>7501 - 10000 ft.</td>
<td>.055</td>
<td>.032</td>
</tr>
</tbody>
</table>

Table 15. Manifold Pressure Settings

**NOTE:** A pressure test adapter kit is available to facilitate manifold pressure measurement.

1. Connect test gauge to manifold pressure tap (Figure 33 and Figure 34) on gas valve.
2. Ignite unit on high fire and let run for 5 minutes to allow for steady state conditions.
3. After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in Table 15.
4. If necessary, make adjustments. Figure 33 and Figure 34 show the location of high fire adjustment screw.
5. If an adjustment is made on high fire, re-check manifold pressure on low fire. Do not adjust low fire manifold pressure. If low fire manifold pressure is more than 1/2” above or below value specified in Table 15, replace valve.

### Proper Combustion

Furnace should operate a minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue outlet and compare to Table 14. The maximum carbon monoxide reading should not exceed 100 ppm.

<table>
<thead>
<tr>
<th>Firing Rate</th>
<th>CO2% for Nat</th>
<th>CO2% for L.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Fire</td>
<td>6.8 - 7.4</td>
<td>7.5 - 9.0</td>
</tr>
<tr>
<td>Low Fire</td>
<td>4.2 - 5.7</td>
<td>5.0 - 6.0</td>
</tr>
</tbody>
</table>

Table 14.

### Supply Line Pressure

A threaded plug on the inlet side of the gas valve provides access to the supply pressure tap.

**Honeywell Valve**
1. Remove the threaded plug.
2. Install a field provided barbed fitting.
3. Connect a manometer.

**White Rodgers Valve**
1. Loosen threaded plug (removal not required).
2. Connect a manometer.

See Table 15 for supply line pressure. Replace or tighten the threaded plug after measurements have been taken.
**High Altitude**
The manifold pressure, gas orifice and pressure switch may require adjustment or replacement to ensure proper operation at higher altitudes. See Table 15 for manifold pressures and Table 16 for pressure switch and gas conversion kits.

---

**WARNING**
For safety, shut unit OFF and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.

---

**Primary and Secondary Limits**
The primary limit is located on the heating compartment vestibule panel. The secondary limits (if equipped) are located in the blower compartment, attached to the back side of the blower. These auto reset limits are factory set and require no adjustment.

---

**Flame Rollout Switches (Two)**
These manually reset switches are located on (or inside of) the burner box. If tripped, check for adequate combustion air before resetting.

---

**Pressure Switches**
The pressure switch assembly (includes two switches) is located in the heating compartment adjacent to the combustion air inducer. These switches check for proper combustion air inducer operation before allowing ignition trial. The switches are factory-set and require no adjustment.

---

**Temperature Rise**
Place the unit into operation with a second-stage heating demand. After supply and return air temperatures have stabilized, check the temperature rise. If necessary, adjust the heating blower speed to maintain the temperature rise within the range shown on the unit nameplate. See Table 11 for allowable heating speeds. Increase the blower speed to decrease the temperature rise. Decrease the blower speed to increase the temperature rise. Failure to properly 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.

---

**Sequence of Operation**
See Figure 35 through Figure 39

---

**Heating**
On a call for heat from the room thermostat, the control board performs a 1 second self check. Upon confirmation that the pressure switch contacts are in an open position, the control energizes the combustion blower on high speed. The control then checks for adequate combustion air by making sure the low-fire pressure switch contacts are closed.

The igniter energizes and is allowed to warm up for 20 seconds before the gas valve energizes on 1st stage and burners ignite. 45 seconds after the control confirms ignition has occurred, the control drops the combustion blower to low speed.

The circulating blower ramps up to 50% of 1st stage heat speed and operates at that speed for one minute (including ramp up time), then at 75% of 1st stage heat speed for an additional minute. After that, the circulating blower operates at full 1st stage heat speed until either the heat call is satisfied or the thermostat initiates a call for 2nd stage heat. On a call for 2nd stage heat, the control energizes the circulating air blower on full CFM 2nd stage heat.

If the automatic heat staging option is being used (see Single Stage Thermostat Operation), the furnace does not switch to 2nd stage heat in response to a call from the thermostat but instead operates at 1st stage heat for the duration of the selected time before automatically switching to 2nd stage heat.

When the call for heat is satisfied, the gas valve and combustion air blower shut down. The control board shuts off the gas valve and runs the combustion blower for an additional 15 seconds. The circulating air blower continues to run for 2 minutes at 82% of the selected heating speed (low fire or high fire) before ramping down.

---

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<tr>
<th>Capacity</th>
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<th>High Altitude Natural Gas Orifice Kit</th>
<th>Natural Gas to LP / Propane Kit</th>
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<td>0 - 4500 ft.</td>
<td>4501 - 7500 ft.</td>
<td>7501 - 10000 ft.</td>
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<td>69W56</td>
<td>51W01</td>
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<td>11K47</td>
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</table>

Table 16. High Altitude Pressure Switch and Gas Conversion Kits
In the event the unit loses ignition, the control will attempt to recycle up to five times before it goes into a 1 hour lockout. Lockout may be manually reset by removing power from the control for more than 1 second or removing the thermostat call for heat for more than 3 seconds.

If during a heating cycle the limit control senses an abnormally high temperature and opens, the control board de-energizes the gas valve and the combustion blower while the circulating blower ramps up to 2nd stage heat speed. The circulating blower remains energized until the limits are closed.

**Fan On**

When the thermostat is set for continuous fan operation and there is no demand for heating or cooling, a call for fan closes the R to G circuit and the circulating blower motor runs at 50% of the selected cooling CFM until switched off. When the call for fan is turned off, the control de-energizes the circulating blower.

**Cooling**

The unit is set up at the factory for single stage cooling. For two stage cooling operation, clip the jumper wire located between the Y to Y2 terminals on the integrated ignition/blower control board.

If the active dehumidification feature is enabled, the circulating blower runs at 82% of the selected cooling speed as long as there is a call for dehumidification.

**IMPORTANT**

The system must not be in either the passive or active dehumidification mode when charging a cooling system.

**Single Stage Cooling**

A call for cooling from the thermostat closes the R to Y circuit on the integrated ignition/blower control board. The control waits for a 1-second delay before energizing the circulating blower to 82% of the selected cooling CFM (passive dehumidification mode). After 7.5 minutes, the circulating blower automatically ramps up to 100% of the selected cooling airflow. When the call for cooling is satisfied, the circulating blower ramps back down to 82% of the selected cooling airflow for 1 minute, then shuts off.

**Two Stage Cooling**

A call for 1st stage cooling from the thermostat closes the R to Y circuit on the control board. The control waits for a 1-second delay before energizing the circulating blower. The blower motor runs at 57% of the selected air flow for the first 7.5 minutes of the 1st stage cooling demand (passive dehumidification mode). After 7.5 minutes, the blower motor runs at 70% of the selected cooling air flow until 1st stage cooling demand is satisfied.

A call for 2nd stage cooling from the thermostat closes the R to Y2 circuit on the control board. The blower motor ramps up to 100% of the selected cooling air flow. When the demand for cooling is met, the blower ramps down to Y1 until satisfied, then ramps down to 57% for 1 minute, then turns off.

**Heat Pump**

For heat pump operation, clip the jumper wire located below the O terminal on the integrated ignition/blower control board. In heat pump mode, a call for heat will result in the circulating air blower operating at the selected cooling airflow after a brief ramp-up period.

**Emergency Replacement Motor Operation**

If the variable speed motor needs to be replaced in an emergency situation (such as “no heat”) and an exact replacement motor is not immediately available, a standard PSC motor of equivalent frame size, voltage, rotation, and horsepower can be temporarily installed until the correct replacement motor can be obtained.

Connect the desired speed tap to the “EAC” terminal and the neutral tap to the neutral terminal on the ignition control (refer to the furnace wiring diagram). The ignition control will control the motor’s operation, including a nominal 20 second “on” delay with a call for heat and a nominal 180 second “off” delay when the thermostat is satisfied. It will also operate the motor on a call for cooling, with no “on” or “off” delays.

Verify that the unit is operating at the desired speed and within the rise range as shown on the unit rating plate.

The correct replacement motor must be installed as soon as possible to ensure continued satisfactory operation of the furnace.
Figure 35. Indoor Blower Operation - 1st Stage-2nd Stage (W1/W2) Heat Call

Figure 36. Indoor Blower Operation - High Heat (W2) Call

Figure 37. Indoor Blower Operation - Call for Fan

Figure 38. Indoor Blower Operation - Single Stage Cooling

Figure 39. Indoor Blower Operation - Two Stage Cooling
Maintenance

⚠️ WARNING
ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD

Failure to follow the 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. Reconnect wires correctly.
• Verify proper operation after servicing.

At the beginning of each heating season, a qualified technician should check the system as follows:

Blower
Check the blower wheel for debris and clean if necessary. The blower motors are pre-lubricated 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 that the furnace operates properly. Replacement filters must be rated for high velocity airflow. Table 1 lists recommended filter sizes.

Flue and Chimney
1. Check flue pipe, chimney and all connections for tightness and to make sure there is no blockage.
2. Check unit for proper draft.

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.

Unit Nameplate____________ Actual____________
Control Diagnostics

Troubleshooting
Make the following visual checks before troubleshooting:

1. Check to see that the power to the furnace and the integrated ignition/blower control board is ON.
2. The manual shutoff valves in the gas line to the furnace must be open.
3. Make sure all wiring connections are secure.
4. Review the Sequence of Operation.

Start the system by setting thermostat above room temperature. Observe system response. Then use the information provided in this section to check the system operation.

The furnace has a built-in, self-diagnostic capability. If a system problem occurs, a fault code is shown by a red LED on the control board. The control continuously monitors its own operation and the operation of the system. If a failure occurs, the LED will indicate the failure code. The flash codes are presented in Table 17.

Fault Code History Button
The control stores the last five fault codes in memory. A pushbutton switch is located on the control (see Figure 43). When the pushbutton switch is pressed and released, the control flashes the stored fault codes. The most recent fault code is flashed first; the oldest fault code is flashed last. To clear the fault code history, press and hold the pushbutton switch in for more than 5 seconds before releasing.

High Heat State LED
On 80G2UH-V models, a green LED is provided on the control board to indicate high heat state (see Table 18).

CFM LED
On 80G2UH-V models equipped with a variable speed motor, an amber LED is provided on the control board to display CFM. To determine what CFM the motor is delivering at any time, count the number of times the amber LED flashes. Each flash signifies 100 CFM; count the flashes and multiply by 100 to determine the actual CFM delivered (for example: 10 flashes x 100 = 1000 CFM).

<table>
<thead>
<tr>
<th>LED Status</th>
<th>Fault Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Off</td>
<td>No power to control or control hardware fault detected</td>
</tr>
<tr>
<td>LED On</td>
<td>Normal operation</td>
</tr>
<tr>
<td>1 Flash</td>
<td>Flame present with gas valve off</td>
</tr>
<tr>
<td>2 Flashes</td>
<td>Pressure switch closed with inducer off</td>
</tr>
<tr>
<td>3 Flashes</td>
<td>Low-fire pressure, rollout, or aux limit switch open</td>
</tr>
<tr>
<td>4 Flashes</td>
<td>High limit switch open</td>
</tr>
<tr>
<td>5 Flashes</td>
<td>Not used</td>
</tr>
<tr>
<td>6 Flashes</td>
<td>Pressure switch cycle lockout</td>
</tr>
<tr>
<td>7 Flashes</td>
<td>Lockout due to no ignition</td>
</tr>
<tr>
<td>8 Flashes</td>
<td>Lockout due to too many flame dropouts</td>
</tr>
<tr>
<td>9 Flashes</td>
<td>Incorrect polarity and phasing</td>
</tr>
</tbody>
</table>

Table 18. High Heat State - Green LED

<table>
<thead>
<tr>
<th>LED Status</th>
<th>Fault Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Off</td>
<td>No demand for high heat</td>
</tr>
<tr>
<td>LED On</td>
<td>High heat demand, operating normally</td>
</tr>
<tr>
<td>LED Flashing</td>
<td>High heat demand, high pressure switch not closed</td>
</tr>
</tbody>
</table>
### Planned Service

The following items should be checked during an annual inspection. Power to the unit must be shut off for the service technician’s safety.

**Fresh air grilles and louvers** (on the unit and in the room where the furnace is installed) - Must be open and unobstructed to provide combustion air.

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

**Vent pipe** - Must be inspected for signs of water, 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 panel** - 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. For instance, items innocently stored next to the furnace may obstruct the combustion air supply. This could cause incomplete combustion and the production of carbon monoxide gas.

### Repair Parts List

The following repair parts are available from the local distributor. When ordering parts, include the complete furnace model number and serial number which are printed on the rating plate located on the furnace. All service must be performed by a licensed professional installer (or equivalent), service agency, or gas supplier.

#### Cabinet Parts
- Heating compartment access panel
- Blower access panel
- Top cap

#### Control Panel Parts
- Transformer
- Two-stage, variable speed integrated control
- Door interlock switch

#### Blower Parts
- Blower wheel
- Blower housing
- Motor
- Motor electronics
- Power Choke (1 hp only)
- Motor mounting frame
- Blower housing cutoff plate

#### Heat Parts
- Flame sensor
- Heat exchanger assembly
- Gas Manifold
- Two speed combustion air inducer
- Two stage gas valve
- Main burner cluster
- Main burner orifices
- Pressure switch
- Ignitor
- Primary limit control
- Flame rollout switch
- Secondary limit
Figure 43. Typical Field Wiring Diagram

NOTES:

1. PRESS AND RELEASE FAULT CODE HISTORY BUTTON TO DISPLAY FAULT CODES. TO ERASE CODES, PRESS AND HOLD BUTTON IN FOR MORE THAN 5 SECONDS.

2. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE FURNACE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMP. RATING OF AT LEAST 90°C.

3. PROPER POLARITY MUST BE OBSERVED FOR FIELD LINE VOLTAGE SUPPLY; IGNITION CONTROL WILL LOCK OUT IF POLARITY IS REVERSED.

4. FOR TEMPORARY SERVICE REPLACEMENT OF CIRCULATING BLOWER MOTOR WITH PSC MOTOR, CONNECT DESIRED SPEED TAP TO “EAC” TERMINAL AND NEUTRAL TAP TO NEUTRAL TERMINAL ON IGNITION CONTROL.

5. DO NOT CONNECT C (COMMON) CONNECTION BETWEEN INDOOR UNIT AND THERMOSTAT EXCEPT WHEN REQUIRED BY THE INDOOR THERMOSTAT. REFER TO THE THERMOSTAT INSTALLATION INSTRUCTIONS.

6. CHECK CODES FOR PROPER WIRING AND CIRCUIT PROTECTION BEFORE INSTALLATION.
Figure 44. Wiring Schematic