RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

⚠️ WARNING
IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠️ WARNING
THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠️ WARNING
PROPOSITION 65 WARNING: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

⚠️ WARNING
— Do not store or use gasoline or other flammable vapors and liquids, or other combustible materials in the vicinity of this or any other appliance.
— WHAT TO DO IF YOU SMELL GAS
  • Do not try to light any appliance.
  • Do not touch any electrical switch; do not use any phone in your building.
  • Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions.
  • If you cannot reach your gas supplier, call the fire department.
  • Do not return to your home until authorized by the gas supplier or fire department.
— DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.
  • U.L. recognized fuel gas and CO (carbon monoxide) detectors are recommended in all applications, and their installation should be in accordance with the manufacturer’s recommendations and/or local laws, rules, regulations, or customs.
  • Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

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

ISO 9001:2008
Certificate Number 3084

92-24161-84-02
SUPERSEDES 92-24161-84-01
## INSTALLATION CHECK LIST

**REFER TO INSTALLATION INSTRUCTIONS**

### GAS SUPPLY
- [ ] Adequate pipe size
- [ ] Correct supply pressure (during furnace operation)
- [ ] Manifold pressure
- [ ] No gas leaks
- [ ] L.P. Kit Number (if applicable)

### ELECTRICAL
- [ ] 115 V.A.C. supply (Single Circuit)
- [ ] Polarity observed
- [ ] Furnace properly grounded
- [ ] Adequate wire size

### FURNACE INSTALLATION
- [ ] Adequate clearance to combustibles
- [ ] Adequate clearance for service (at front)

### DUCT STATIC PRESSURE
- [ ] in. w.c. on heating speed
- [ ] in. w.c. on cooling speed
- [ ] Air temperature rise

### CONDENSATE LINE
- [ ] Trap filled with water
- [ ] Vented
- [ ] Sloped toward drain
- [ ] Condensate drain line hoses connected and clamped
- [ ] Freeze protection (if necessary)

### VENTING – DIRECT VENT
- [ ] in. diameter – intake pipe
- [ ] in. diameter – exhaust pipe
- [ ] ft. of pipe – intake air
- [ ] no. of elbows – intake air
- [ ] ft. of pipe – exhaust pipe
- [ ] no. of elbows – exhaust pipe
- [ ] Exhaust Vent Temperature

### TERMINATIONS – DIRECT VENT

**VERTICAL**
- [ ] Intake – 12” min. above roof/snow level
- [ ] Correct relationship – exhaust to intake

**HORIZONTAL/VERTICAL – CONCENTRIC (RXGY-E03A)**
- [ ] Intake – 12” min. above roof/snow level
- [ ] Intake “Y” rotated above center
- [ ] Exhaust sloped toward furnace

**HORIZONTAL – STANDARD (RXGY-D02, -D03) – US (RXGY-D02A, RXGY-D03A) – CANADA**
- [ ] Correct relationship – exhaust to intake
- [ ] 12” min. above grade/snow level

**HORIZONTAL – ALTERNATE (RXGY-D02, -D03 OR -D04) – US (RXGY-D02A, -D03A, -D04A) – CANADA**
- [ ] Correct relationship – exhaust to intake
- [ ] Above anticipated snow level

### VENTING – NON-DIRECT VENT
- [ ] in. diameter – exhaust pipe
- [ ] ft. of pipe – exhaust
- [ ] no. of elbows

### TERMINATION – NON-DIRECT VENT

**VERTICAL**
- [ ] 12” min. above roof/snow level

**HORIZONTAL – STANDARD**
- [ ] 12” min. above grade/snow level

**HORIZONTAL – ALTERNATE**
- [ ] Above anticipated snow level

- [ ] Model Number
- [ ] Serial Number
- [ ] Date of Installation
IMPORTANT: All manufacturer products meet current Federal OSHA Guidelines for safety. California Proposition 65 warnings are required for certain products, which are not covered by the OSHA standards.

California's Proposition 65 requires warnings for products sold in California that contain, or produce, any of over 600 listed chemicals known to the State of California to cause cancer or birth defects such as fiberglass insulation, lead in brass, and combustion products from natural gas.

All "new equipment" shipped for sale in California will have labels stating that the product contains and/or produces Proposition 65 chemicals. Although we have not changed our processes, having the same label on all our products facilitates manufacturing and shipping. We cannot always know "when, or if" products will be sold in the California market.

You may receive inquiries from customers about chemicals found in, or produced by, some of our heating and air-conditioning equipment, or found in natural gas used with some of our products. Listed below are those chemicals and substances commonly associated with similar equipment in our industry and other manufacturers.

• Glass Wool (Fiberglass) Insulation
• Carbon Monoxide (CO)
• Formaldehyde
• Benzene

More details are available at the Websites for OSHA (Occupational Safety and Health Administration), at www.osha.gov and the State of California's OEHHHA (Office of Environmental Health Hazard Assessment), at www.oehha.org.

Consumer education is important since the chemicals and substances on the list are found in our daily lives. Most consumers are aware that products present safety and health risks, when improperly used, handled and maintained.

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NOTE: A load calculation must be performed to properly determine the required furnace BTU size for the structure. Also, the duct must be properly designed and installed for proper airflow. Existing ductwork must be inspected for proper size and sealed system. Proper airflow is necessary for both user comfort and equipment performance.

Before opening the furnace carton and installation of the furnace, verify the data tags on the carton and inside the furnace, match and is what was ordered from the local distributor. Also, check for any damage to the furnace before installation.

IMPORTANT: Proper application, installation and maintenance of this furnace and system is a must if consumers are to receive the full benefits for which they have paid.

The RGRM and RGMT series furnaces are design-certified by CSA for use with natural and propane gases as follows:

1. As non-direct vent central forced air furnaces taking combustion air from the installation area or using air ducted from the outside.
2. As direct vent central forced air furnaces with all combustion air supplied directly to the furnace burners through a special air intake system outlined in these instructions. Install this furnace in accordance with the American National Standard Z223.1 – latest edition entitled “National Fuel Gas Code” (NFPA54) and requirements or codes of the local utilities or other authorities having jurisdiction. This is available from the following:

   National Fire Protection Association, Inc.
   Battery march Park
   Quincy, MA 02269

CSA-INTERNATIONAL
8501 East Pleasant Valley Road
Cleveland, Ohio 44131-5575

Install units in Canada in accordance with CSA-B149, local installation codes and authorities having jurisdiction. CSA-B149 is available from:

CSA-INTERNATIONAL
178 Rexdale Blvd.
Toronto, Ontario
Canada M9W, 1R3

NOTE: It is our recommendation that any HVAC equipment which were subject to flooding be replaced to avoid any risk of property damage, personal injury or death. Also, our position that the immersion by flood waters compromises any HVAC products thus voiding this warranty.

IMPORTANT: Remove bracket from models where applicable. See Figure 1.

FIGURE 1

CAUTION

SHIPPING BRACKET MUST BE REMOVED FROM SIDE OF BLOWER HOUSING
**FIGURE 2**

**UPFLOW FURNACE COMPONENTS**

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NAME</th>
<th>NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CONDENSATE TRAP</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>DOOR SWITCH</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>JUNCTION BOX</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>TRANSFORMER</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>PRESSURE SWITCHES</td>
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<td>6</td>
<td>EXHAUST TRANSITION</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>CONNECTOR</td>
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<tr>
<td>8</td>
<td>OUTLET AIR PIPE</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>SHIPPING PLUG (TO BE REMOVED)</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>FLAME SENSOR*</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>OVERTEMPERATURE SWITCH*</td>
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</tr>
<tr>
<td>12</td>
<td>TOP PLATE</td>
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<tr>
<td>13</td>
<td>BURNER</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>IGNITER*</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>COMBUSTION AIR INLET</td>
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<td>16</td>
<td>OPTIONAL AIR INLET (UPFLOW UNITS ONLY)</td>
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<td>17</td>
<td>OPTIONAL GAS INLET</td>
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<td>18</td>
<td>GAS VALVE</td>
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</tr>
<tr>
<td>19</td>
<td>INDUCED DRAFT BLOWER</td>
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</tr>
<tr>
<td>20</td>
<td>CAPACITOR*</td>
<td>20</td>
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<tr>
<td>21</td>
<td>BLOWER</td>
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<td>22</td>
<td>LOW VOLTAGE TERMINAL</td>
<td>22</td>
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<tr>
<td>23</td>
<td>CONTROL MOUNTING PLATE</td>
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</tr>
<tr>
<td>24</td>
<td>FILTER / SOLID METAL BASEPLATE</td>
<td>24</td>
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<tr>
<td>25</td>
<td>POWER FACTOR CORRECTION CHOICE*</td>
<td>25</td>
</tr>
<tr>
<td>26</td>
<td>AIR CIRCULATING BLOWER*</td>
<td>26</td>
</tr>
</tbody>
</table>

*These components may be only partially visible in this photo.

**NOTE:** A PARTS BAG IS INCLUDED WITH THE FURNACE. IF A NEW PARTS BAG NEEDS TO BE ORDERED, USE THE FOLLOWING PART NUMBERS: AS-100717-01 FOR -GRM-45, -GRM-60, -GRM-75, GRM-90 AND GRM-105 AS-100717-02 FOR -GRM-120.
**IMPORTANT INFORMATION ABOUT EFFICIENCY AND INDOOR AIR QUALITY**

Central cooling and heating equipment is only as efficient as the duct system that carries the cooled or heated air. To maintain efficiency, comfort and good indoor air quality, it is important to have the proper balance between the air supplied to each room and the air returning to the cooling and heating equipment.

Proper balance and sealing of the duct system improves the efficiency of the heating and air conditioning system and improves the indoor air quality of the home by reducing the amount of airborne pollutants that enter homes from spaces where the ductwork and/or equipment is located. The manufacturer and the U.S. Environmental Protection Agency’s Energy Star Program recommend that central duct systems be checked by a qualified contractor for proper balance and sealing.

⚠️ **WARNING**

**DUCT LEAKS CAN CREATE AN UNBALANCED SYSTEM AND DRAW POLLUTANTS SUCH AS DIRT, DUST, FUMES AND ODORS INTO THE HOME CAUSING PROPERTY DAMAGE. FUMES AND ODORS FROM TOXIC, VOLATILE OR FLAMMABLE CHEMICALS, AS WELL AS AUTOMOBILE EXHAUST AND CARBON MONOXIDE (CO), CAN BE DRAWN INTO THE LIVING SPACE THROUGH LEAKING DUCTS AND UNBALANCED DUCT SYSTEMS CAUSING PERSONAL INJURY OR DEATH (SEE FIGURE 3).**

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN GARAGES OR OFF-GARAGE STORAGE AREAS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST BE SEALED TO LIMIT THE MIGRATION OF TOXIC FUMES AND ODORS INCLUDING CARBON MONOXIDE FROM MIGRATING INTO THE LIVING SPACE.**

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN SPACES CONTAINING FUEL BURNING APPLIANCES SUCH AS WATER HEATERS OR BOILERS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST ALSO BE SEALED TO PREVENT DEPRESSURIZATION OF THE SPACE AND POSSIBLE MIGRATION OF COMBUSTION BYPRODUCTS INCLUDING CARBON MONOXIDE INTO THE LIVING SPACE.**

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**FIGURE 3**

MIGRATION OF DANGEROUS SUBSTANCES, FUMES, AND ODORS INTO LIVING SPACES

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**NOTICE**

**IMPROPER INSTALLATION, OR INSTALLATION NOT MADE IN ACCORDANCE WITH THE CSA INTERNATIONAL (CSA) CERTIFICATION OR THESE INSTRUCTIONS, CAN RESULT IN UNSATISFACTORY OPERATION AND/OR DANGEROUS CONDITIONS AND ARE NOT COVERED BY THE UNIT WARRANTY.**

**NOTICE**

IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RECOMMENDED THAT AN AUXILIARY DRAIN PAN BE INSTALLED UNDER ALL EVAPORATOR COILS OR UNITS CONTAINING EVAPORATOR COILS THAT ARE LOCATED IN ANY AREA OF A STRUCTURE WHERE DAMAGE TO THE BUILDING OR BUILDING CONTENTS MAY OCCUR AS A RESULT OF AN OVERFLOW OF THE COIL DRAIN PAN OR A STOPPAGE IN THE PRIMARY CONDENSATE DRAIN PIPING. SEE ACCESSORIES SECTION OF THESE INSTRUCTIONS FOR AUXILIARY HORIZONTAL OVERFLOW PAN INFORMATION (MODEL RXBM).

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**RECEIVING**

Immediately upon receipt, all cartons and contents should be inspected for transit damage. Units with damaged cartons should be opened immediately. If damage is found, it should be noted on the delivery papers, and a damage claim filed with the last carrier.

- After unit has been delivered to job site, remove carton taking care not to damage unit.
- Check the unit rating plate for unit size, electric heat, coil, voltage, phase, etc. to be sure equipment matches what is required for the job specification.

- Read the entire instructions before starting the installation.
- Some building codes require extra cabinet insulation and gasketing when unit is installed in attic applications.
- If installed in an unconditioned space, apply caulking around the power wires, control wires, refrigerant tubing and condensate line where they enter the cabinet. Seal the power wires on the inside where they exit conduit opening. Caulking is required to prevent air leakage into and condensate from forming inside the unit, control box, and on electrical controls.
- Install the unit in such a way as to allow necessary access to the coil/filter rack and blower/control compartment.
- Install the unit in a level position to ensure proper condensate drainage. Make sure unit is level in both directions within 1/8".
- Install the unit in accordance with any local code which may apply and the national codes. Latest editions are available from: “National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269.” These publications are:
  - NFPA90A Installation of Air Conditioning and Ventilating Systems.
  - NFPA90B Installation of warm air heating and air conditioning systems.
- The equipment has been evaluated in accordance with the Code of Federal Regulations, Chapter XX, Part 3280.
SAFETY INFORMATION

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

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

1. INSTALLATION OF CARBON MONOXIDE DETECTORS. At the time of installation of the side wall vertically vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontally vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

b. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

2. APPROVED CARBON MONOXIDE DETECTORS. Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. SIGNAGE. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, “GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS”.

4. INSPECTION. The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

(b) EXEMPTIONS: The following equipment is exempt from 248 CMR 5.08(2)(a) through 4:

1. The equipment listed in Chapter 10 entitled “Equipment Not Required To Be Vented” in the most current edition of NFPA 54 as adopted by the Board; and

2. Product Approved side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

(c) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM PROVIDED. When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for the installation of the venting system design or the venting system components; and

2. A complete parts list for the venting system design or venting system.

(d) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED. When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases,

but identifies “special venting systems”, the following requirements shall be satisfied by the manufacturer:

1. The referenced “special venting system” instructions shall be included with the appliance or equipment installation instructions; and

2. The “special venting systems” shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

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

⚠️ WARNING

USE ONLY WITH TYPE OF GAS APPROVED FOR THIS FURNACE. REFER TO THE FURNACE RATING PLATE.

⚠️ WARNING

INSTALL THIS FURNACE ONLY IN A LOCATION AND POSITION AS SPECIFIED IN THE LOCATION REQUIREMENTS AND CONSIDERATIONS SECTION OF THESE INSTRUCTIONS. PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE FURNACE SPACE AS SPECIFIED IN THE VENTING SECTION OF THESE INSTRUCTIONS.

⚠️ WARNING

PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE FURNACE SPACE AS SPECIFIED IN THE COMBUSTION AND VENTILATION AIR SECTION OF THESE INSTRUCTIONS.

⚠️ WARNING

COMBUSTION PRODUCTS MUST BE DISCHARGED OUTDOORS. CONNECT THIS FURNACE TO AN APPROVED VENT SYSTEM ONLY, AS SPECIFIED IN VENT PIPE INSTALLATION SECTION OF THESE INSTRUCTIONS.
WARNING
DO NOT OPERATE THE SYSTEM WITHOUT FILTERS. A PORTION OF THE DUST ENTRAINéd IN THE AIR MAY TEMPORARILY LODGE IN THE AIR DUCT RUNS AND AT THE SUPPLY REGISTERS. ANY CIRCULATED DUST PARTICLES WILL BE HEATED AND CHARED BY CONTACT WITH THE FURNACE HEAT EXCHANGER. THIS Soot-RESIDUE WILL SOIL CEILINGS, WALLS, DRAPEs, CARPETS AND OTHER HOUSEHOLD ARTICLES. SOOT DAMAGE MAY ALSO RESULT WITH, OR WITHOUT, FILTERS IN PLACE. WHEN CERTAIN TYPES OF CANDLES ARE BURNED, OR CANDLEWICKS ARE LEFT UTRIMMED.

WARNING
NEVER TEST FOR GAS LEAKS WITH AN OPEN FLAME. USE A COMMERCIALlY AVAILABLE SOAP SOLUTION MADE SPECIFICALLY FOR THE DETECTION OF LEAKS TO CHECK ALL CONNECTIONS, AS SPECIFIED IN GAS SUPPLY AND PIPING SECTION OF THESE INSTRUCTIONS.

WARNING
ALWAYS INSTALL FURNACE TO OPERATE WITHIN THE FURNACE'S INTENDED TEMPERATURE-RISE RANGE WITH A DUCT SYSTEM WHICH HAS AN EXTERNAL STATIC PRESSURE WITHIN THE ALLOWABLE RANGE, AS SPECIFIED IN DUCTING SECTION OF THESE INSTRUCTIONS. SEE ALSO FURNACE RATING PLATE.

WARNING
WHEN A FURNACE IS INSTALLED SO THAT SUPPLY DUCTS CARRY AIR CIRCULATED BY THE FURNACE TO AREAS OUTSIDE THE SPACE CONTAINING THE FURNACE, THE RETURN AIR SHALL ALSO BE HANDLED BY DUCT(S) SEALED TO THE FURNACE CASING AND TERMINATING OUTSIDE THE SPACE CONTAINING THE FURNACE.

WARNING
DO NOT INSTALL THIS FURNACE IN A MOBILE HOME!! THIS FURNACE IS NOT APPROVED FOR INSTALLATION IN A MOBILE HOME. DOING SO COULD CAUSE FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

WARNING
WHEN THIS FURNACE IS INSTALLED IN A RESIDENTIAL GARAGE, IT MUST BE INSTALLED SO THE BURNERS AND IGNITION SOURCE ARE LOCATED NO LESS THAN 18 INCHES ABOVE THE FLOOR. THIS IS TO REDUCE THE RISK OF IGNITING FLAMMABLE VAPORS WHICH MAY BE PRESENT IN A GARAGE.

WARNING
DUCT LEAKS CAN CREATE AN UNBALANCED SYSTEM AND DRAW POLLUTANTS SUCH AS DIRT, DUST, FUMES AND ODORS INTO THE HOME CAUSING PROPERTY DAMAGE. FUMES AND ODORS FROM TOXIC, VOLATILE OR FLAMMABLE CHEMICALS, AS WELL AS AUTOMOBILE EXHAUST AND CARBON MONOXIDE (CO), CAN BE DRAWN INTO THE LIVING SPACE THROUGH LEAKING DUCTS AND UNBALANCED DUCT SYSTEMS CAUSING PERSONAL INJURY OR DEATH (SEE FIGURE 3).

WARNING
THE FURNACE MAY BE USED FOR HEATING OF BUILDINGS OR STRUCTURES UNDER CONSTRUCTION.

NOTICE
IMPROPER INSTALLATION, OR INSTALLATION NOT MADE IN ACCORDANCE WITH THE CSA INTERNATIONAL (CSA) CERTIFICATION OR THESE INSTRUCTIONS, CAN RESULT IN UNSATISFACTORY OPERATION AND/OR DANGEROUS CONDITIONS AND ARE NOT COVERED BY THE UNIT WARRANTY.

NOTICE
IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RECOMMENDED THAT AN AUXILIARY DRAIN PAN BE INSTALLED UNDER ALL EVAPORATOR COILS OR UNITS CONTAINING EVAPORATOR COILS THAT ARE LOCATED IN ANY AREA OF A STRUCTURE WHERE DAMAGE TO THE BUILDING OR BUILDING CONTENTS MAY OCCUR AS A RESULT OF AN OVERFLOW OF THE COIL DRAIN PAN OR A STOPPAGE IN THE PRIMARY CONDENSATE DRAIN PIPING. SEE ACCESSORIES SECTION OF THESE INSTRUCTIONS FOR AUXILIARY HORIZONTAL OVERFLOW PAN INFORMATION (MODEL RXBM).
GENERAL INFORMATION

WARNING
DO NOT INSTALL THIS FURNACE IN A MOBILE HOME!! This furnace is not approved for installation in a mobile home. Doing so could cause FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

WARNING
WHEN THIS FURNACE IS INSTALLED IN A RESIDENTIAL GARAGE, IT MUST BE INSTALLED SO THE BURNERS AND IGNITION SOURCE ARE LOCATED NO LESS THAN 18 INCHES ABOVE THE FLOOR. THIS IS TO PREVENT THE RISK OF IGNITING FLAMMABLE VAPORS WHICH MAY BE PRESENT IN A GARAGE. ALSO, THE FURNACE MUST BE LOCATED OR PROTECTED TO AVOID PHYSICAL DAMAGE BY VEHICLES. FAILURE TO FOLLOW THESE WARNINGS CAN CAUSE A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

1. IMPORTANT: If installing the unit over a finished ceiling or living area, be certain to install an auxiliary condensate drain pan under the entire unit. This auxiliary drain pan should extend under any evaporator coil installed with the furnace and the open portion of the condensate drain assembly. See “Condensate Drain/ Neutralizer” section for more details.

2. IMPORTANT: If using a cooling evaporator coil with this furnace,:
   a. be sure the air passes over the heat exchanger before passing over the cooling coil. The cooled air passing over the warm ambient air inside the heat exchanger tubes can cause condensation inside the tubes resulting in corrosion and eventual failure.

   or

   b. install a parallel duct system to divert all the air from the furnace allowing it to pass over the cooling coil only. Use dampers or other means to prevent chilled air from passing over the heat exchanger.

   If these are manual dampers, they must be equipped to prevent heating or cooling operation unless the damper is in the full heat or cool position.

3. IMPORTANT: Install the furnace level. If it is not level, condensate cannot drain properly, possibly causing furnace shut down.

   NOTE: These furnaces are approved for installation in attics, as well as alcoves, utility rooms, closets and crawlspaces. Provisions must be made to prevent freezing of condensate.

4. IMPORTANT: If this furnace is installed in a garage, attic and/or any unconditioned space, install a self-regulating heat tape around the condensate trap and along the entire length of the condensate drain in the unconditioned space.

   When the condensing horizontal gas furnace is installed in an unconditioned space where the temperature would be capable of reaching close to or below 32°F (0°C), a self-regulating heat tape is required on the condensate drain, along with an insulation wrap. The heat tape should meet the following requirements:
   a. The heat tape must be UL listed.
   b. The heat tape must be installed per the manufacturer’s instructions for the entire length of drain pipe in the unconditioned space.
   c. The heat tape should be rated at 5 or 6 watts per foot at 120V. See Figure 4.

5. IMPORTANT: Support this unit when installed. Since this furnace is suitable for attic or crawl space installation, it may be installed on combustible wood flooring or by using support brackets.

   a. allow the largest part of the furnace to pass; or
   b. allow any other appliance (such as a water heater) to pass.
   c. allow service clearance

FIGURE 4
HORIZONTAL FURNACE W/HEAT TAPE ON CONDENSATE TRAP
**CAUTION**

THIS FURNACE IS NOT APPROVED OR RECOMMENDED FOR INSTALLATION ON ITS BACK, WITH ACCESS DOORS FACING UPWARDS OR IN ANY HORIZONTAL CONFIGURATION.

**SITE SELECTION**

1. Select a site in the building near the center of the proposed, or existing, duct system.
2. Give consideration to the vent system piping when selecting the furnace location. Be sure the venting system can get from the furnace to the termination with minimal length and elbows.
3. Locate the furnace near the existing gas piping. Or, if running a new gas line, locate the furnace to minimize the length and elbows in the gas piping. See Figure 5.
4. Locate the furnace to maintain proper clearance to combustibles as shown in following Figures 6, 7, 8.

**WARNING**

DO NOT LIFT THE UNIT BY THE HEAT EXCHANGER TUBES. DOING SO CAN DAMAGE THE HEAT EXCHANGER ASSEMBLY.

**CLEARANCE - ACCESSIBILITY**

The design of forced air furnaces with input ratings as listed in the tables under Figures 6, 7, 8 are certified by CSA-International for the clearances to combustible materials shown in inches.

See name/rating plate and clearance label for specific model number and clearance information.

Service clearance of at least 24 inches is recommended in front of all furnaces.

**NOTE:** Use recommended 24” clearance if accessibility clearances are greater than fire protection clearances.

**WARNING**

UPFLOW FURNACES ARE DESIGN-CERTIFIED FOR INSTALLATION ON COMBUSTIBLE FLOORS.

NOTE, HOWEVER, THAT FURNACES MUST NOT BE INSTALLED DIRECTLY ON CARPETING, TILE OR OTHER COMBUSTIBLE MATERIAL OTHER THAN WOOD FLOORING.

INSTALLATION ON A COMBUSTIBLE MATERIAL CAN RESULT IN FIRE, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

**WARNING**

COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE FURNACE JACKET. THE AREA AROUND THE FURNACE MUST BE KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. PLACEMENT OF COMBUSTIBLE MATERIALS ON, AGAINST OR AROUND THE FURNACE JACKET CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THE HOMEOWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.

**FIGURE 5**

HORIZONTAL FURNACE INSTALLED W/SUPPORT BRACKETS

Upflow furnaces are shipped with a bottom closure panel installed. When bottom return air is used, remove the panel by removing the two screws attaching the panel to the front base angle. See filter section for details.
**FIGURE 6**
CLEANACE TO COMBUSTIBLES, UPFLOW UNITS

UPFLOW MODELS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>LEFT SIDE</th>
<th>RIGHT SIDE</th>
<th>BACK</th>
<th>TOP</th>
<th>FRONT</th>
<th>VENT</th>
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</table>

*A service clearance of at least 24 inches is recommended in front of all furnaces.*
### FIGURE 7
CLEARANCE TO COMBUSTIBLES, DOWNFLOW UNITS

#### DOWNFLOW MODELS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<th>LEFT SIDE</th>
<th>RIGHT SIDE</th>
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<td>2*</td>
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</tr>
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* A service clearance of at least 24 inches is recommended in front of all furnaces.

---

**NOTE:** IN DOWNFLOW CONFIGURATION, RETURN AIR CUTOUT IS NOT PERMITTED.
**FIGURE 8**

**CLEARANCE TO COMBUSTIBLES, HORIZONTAL UNITS**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</table>

*A service clearance of at least 24 inches is recommended in front of all furnaces.*

**AIRFLOW**

**DRAIN TRAP LOCATION**

**RETURN AIR**

**NOTE:** In horizontal configuration, return air cutout is not permitted. Horizontal left-hand airflow only.

**IMPORTANT:** This furnace is not approved or recommended for installation on its back, with access doors facing upwards.
DUCTING
Proper airflow is required for the correct operation of this furnace. Too little airflow can cause erratic operation and can damage the heat exchanger. The duct system must carry the correct amount of air for heating and cooling if summer air conditioning is used.

**WARNING**

**SOME HEATING AIRFLOW VALUES MAY BE HIGHER THAN THOSE REQUIRED FOR COOLING.**

BE SURE TO SIZE DUCT FOR THE MAXIMUM POSSIBLE AIRFLOW VALUE.

Size the ducts according to acceptable industry standards and methods. The total static pressure drop of the air distribution system should not exceed 0.5” w.c.

**NEVER ALLOW THE PRODUCTS OF COMBUSTION FROM THE FLUE TO ENTER THE RETURN AIR DUCTWORK OR THE CIRCULATED AIR SUPPLY. ALL RETURN DUCTWORK MUST BE ADEQUATELY SEALED AND SECURED TO THE FURNACE WITH SHEET METAL SCREWS; AND JOINTS, TAPPED. ALL OTHER DUCT JOINTS MUST BE SECURED WITH APPROVED CONNECTIONS AND SEALED AIRTIGHT. WHEN AN UPFLOW FURNACE IS MOUNTED ON A PLATFORM WITH RETURN THROUGH THE BOTTOM, IT MUST BE SEALED AIRTIGHT BETWEEN THE FURNACE AND THE RETURN AIR PLENUM. THE FLOOR OR PLATFORM MUST PROVIDE SOUND PHYSICAL SUPPORT OF THE FURNACE WITHOUT SAGGING, CRACKS, OR GAPS, AROUND THE BASE, PROVIDING A SEAL BETWEEN THE SUPPORT AND THE BASE.

FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT RETURN OR SUPPLY DUCTWORK TO OR FROM ANY OTHER HEAT PRODUCING DEVICE SUCH AS A FIREPLACE INSERT, STOVE, ETC. DOING SO MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY OR PROPERTY DAMAGE.

**IMPORTANT:** Some high efficiency filters have a greater than normal resistance to air flow. This can adversely affect furnace operation. BE SURE TO CHECK AIR FLOW AND STATIC PRESSURE.

---

UPFLOW UNITS

1. Position the unit to minimize long runs of duct or runs of duct with many turns and elbows.

2. Open the return air compartment.

**WARNING**

UPFLOW FURNACE: A SOLID METAL BASE PLATE MUST REMAIN IN THE FURNACE BOTTOM WHEN USING SIDE AIR RETURN. FAILURE TO INSTALL A BASE PLATE COULD CAUSE THE PRODUCTS OF COMBUSTION TO CIRCULATE INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING OR DEATH. FOR BOTTOM RETURN, REMOVE SOLID METAL BASE PLATE.

a. Cut an opening in the side. The opening should be cut the full width and height of the knockouts on the unit. See Figure 9.

---

**FIGURE 9**

**UPFLOW CUTOUT AND DRILL INFORMATION**

**WARNING**

UPFLOW CUTOUT AND DRILL INFORMATION

**NOTE:** Where the maximum airflow is 1800 CFM or more, both sides or the bottom must be used for return air.

3. Connect the return duct or return air cabinet to the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

4. **Be sure to have adequate space for the unit filter.**

**NOTE:** DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

5. If summer air conditioning is desired, position the indoor coil on the supply-air side of the unit. Insure that no air can bypass this coil.

6. Connect the supply air plenum to the furnace plenum opening.

**IMPORTANT:** If a flexible duct connector must be used, it MUST be rated for a minimum temperature of 250°F continuous.

---

**NOTE:** When using outside air, design and adjust the system to maintain a return air temperature ABOVE 55° F during the heating season.

**NOTE:** Return air grilles and warm air registers must not be obstructed or closed.

**UPFLOW UNITS**

1. Position the unit to minimize long runs of duct or runs of duct with many turns and elbows.

2. Open the return air compartment.

**WARNING**

UPFLOW FURNACE: A SOLID METAL BASE PLATE MUST REMAIN IN THE FURNACE BOTTOM WHEN USING SIDE AIR RETURN. FAILURE TO INSTALL A BASE PLATE COULD CAUSE THE PRODUCTS OF COMBUSTION TO CIRCULATE INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING OR DEATH. FOR BOTTOM RETURN, REMOVE SOLID METAL BASE PLATE.

a. Cut an opening in the side. The opening should be cut the full width and height of the knockouts on the unit. See Figure 9.

---

**FIGURE 9**

UPFLOW CUTOUT AND DRILL INFORMATION

**WARNING**

UPFLOW CUTOUT AND DRILL INFORMATION

**NOTE:** Where the maximum airflow is 1800 CFM or more, both sides or the bottom must be used for return air.

3. Connect the return duct or return air cabinet to the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

4. **Be sure to have adequate space for the unit filter.**

**NOTE:** DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

5. If summer air conditioning is desired, position the indoor coil on the supply-air side of the unit. Insure that no air can bypass this coil.

6. Connect the supply air plenum to the furnace plenum opening.

**IMPORTANT:** If a flexible duct connector must be used, it MUST be rated for a minimum temperature of 250°F continuous.
DOWNFLOW UNITS
1. Position the unit to minimize long runs of duct or runs of duct with many turns and elbows.
2. If summer air conditioning is desired, position the indoor coil on the supply-air side of the unit. Insure that no air can bypass this coil.
3. If installing on a combustible floor and not using an air conditioning plenum, install the special non-combustible floor base. See Table 1 and Figure 10.

WARNING
THE DOWNFLOW FURNACE DESIGN IS CERTIFIED FOR INSTALLATION ON A NON-COMBUSTIBLE FLOOR. USE THE SPECIAL BASE SPECIFIED ON THE FURNACE CLEARANCE LABEL. FAILURE TO INSTALL THE SPECIAL BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS SHIPPED FROM THE FACTORY AS AN ACCESSORY.

4. Connect the furnace to the supply air plenum.
5. Connect the return air ducting to the return air opening at the top of the unit. Make the connection airtight to prevent pulling combustion gases from an adjacent fuel-burning appliance.

NOTE: In downflow configuration, return air cut out is not permitted.
6. Be sure to have adequate space for the unit filter.

NOTE: DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

HORIZONTAL UNIT
IMPORTANT: THIS FURNACE MAY ONLY BE INSTALLED SO AS WHEN FACING THE FRONT OF THE FURNACE, SUPPLY AIR IS DISCHARGED ON THE LEFT HAND SIDE.
1. Position the unit to minimize long runs of duct or runs of duct with many turns and elbows.
2. If summer air conditioning is desired, position the indoor coil on the supply air side of the unit. Insure that no air can bypass this coil.
3. Connect the furnace to the supply air plenum.
4. Connect the return air ducting to the return air opening at the right end of the unit. Make the connection airtight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

NOTE: In horizontal configuration, return air cut out is not permitted.
5. Be sure to have adequate space for the unit filter.

NOTE: DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

<table>
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<tr>
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</tr>
</thead>
<tbody>
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<td>NON-COMBUSTIBLE FLOOR BASES</td>
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</table>

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</table>

FIGURE 10
NON-COMBUSTIBLE FLOOR BASE
VENTING AND COMBUSTION AIR PIPING

GENERAL INFORMATION

WARNING

READ AND FOLLOW ALL INSTRUCTIONS IN THIS SECTION. FAILURE TO PROPERLY VENT THIS FURNACE CAN CAUSE CARBON MONOXIDE POISONING OR AN EXPLOSION OR FIRE, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

This furnace removes both sensible and latent heat from the combustion flue gases. Removal of latent heat results in condensation of flue gas water vapor. This condensed water vapor drains from the secondary heat exchanger and out of the unit into a drain trap. When installed as a non-direct vent furnace, only exhaust piping is required and inside combustion air may be used. Refer to section on “COMBUSTION & VENTILATION AIR FOR FURNACE INSTALLATIONS.”

Direct vent installations require a dedicated combustion air and venting system. All air for combustion is taken from the outside atmosphere and all combustion products are discharged to the outdoors.

The combustion air and vent pipe fittings must conform to American National Standards Institute (ANSI) and American Society for Testing Materials (ASTM) standards D1785 (Schedule 40 PVC), D2241 (SDR-21 and SDR26-26 PVC), D2661 (ABS-DWV) or F628 (Schedule 40 ABS-DWV).

WARNING

IN CANADA, PRODUCTS CERTIFIED FOR INSTALLATION AND INTENDED TO BE VENTED WITH PLASTIC VENT SYSTEMS (PVC, CPVC) MUST USE VENT SYSTEMS THAT ARE CERTIFIED TO THE STANDARD FOR TYPE BH GAS VENTING SYSTEMS, ULC S636.

THE COMPONENTS OF THE CERTIFIED MATERIAL MUST NOT BE INTERCHANGED WITH OTHER VENT SYSTEMS OR UNLISTED PIPE/FITTINGS.

PLASTIC COMPONENTS AND SPECIFIED PRIMERS AND GLUES TO THE CERTIFIED SYSTEM MUST BE FROM A SINGLE SYSTEM MANUFACTURER AND NOT INTERMIXED WITH OTHER SYSTEM MANUFACTURER’S PARTS.

NOTE: INLET AIR PIPING IS NOT CONSIDERED TO BE A PART OF THE “VENTING SYSTEM”, THE

REQUIREMENT THAT VENT MATERIAL BE CERTIFIED TO ULC S636 DOES NOT APPLY TO INLET AIR PIPING.

IMPORTANT: The plastic combustion air and venting components are of Schedule 40 PVC. If using ABS piping, ensure that the solvent cement is compatible for joining PVC to ABS components or use a mechanical connection that can withstand the vent temperatures and is corrosion resistant.

NOTE: Schedule 40 ABS-DWV pipe and fittings may be used as an alternate to PVC pipe for the combustion air inlet and vent pipes.

NOTE: Cellular core PVC is also approved for use. It must be schedule 40 PVC-DWV cellular pipe for non-pressure applications and manufactured under ASTM F-891.

NOTE: With the furnace correctly vented, the inducer will move approximately 25 cfm per 100,000 Btu’s.

IMPORTANT: No part of the combustion air and vent pipes may run under ground.

OVERTEMPERATURE SAFETY SWITCHES

Furnaces are equipped with safety switches in the control compartment to protect against overtemperature conditions caused by inadequate combustion air supply. The switches are located in the burner compartment. If a switch is tripped it must be manually reset.

WARNING

DO NOT JUMPER THESE DEVICES! IF ONE OF THESE SWITCHES SHOULD TRIP, A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER MUST BE CALLED TO CHECK AND/OR CORRECT FOR ADEQUATE COMBUSTION AIR SUPPLY. DO NOT RESET THE SWITCHES WITHOUT TAKING CORRECTIVE ACTION TO ASSURE THAT AN ADEQUATE SUPPLY OF COMBUSTION AIR IS MAINTAINED UNDER ALL CONDITIONS OF OPERATION. FAILURE TO DO SO CAN RESULT IN CARBON MONOXIDE POISONING OR DEATH. IF THIS UNIT IS MOUNTED IN A CLOSED, THE DOOR MUST BE CLOSED WHEN MAKING THIS CHECK.

REPLACE THESE SWITCHES ONLY WITH THE IDENTICAL REPLACEMENT PART.

EXISTING VENT SYSTEMS

When the installation of this furnace replaces an existing furnace that is removed from a vent system serving other appliances, the vent system is likely to be too large to properly vent the remaining attached appliances. The following steps should be followed with each appliance remaining connected to the original common vent system. Place the appliance to be tested in operation, while the other appliances remaining connected to the common vent system are not in operation. Test the operation of each appliance individually by the following method.

1. Permanently seal any unused openings in the common venting system.

2. Visually inspect the venting system for proper size and horizontal pitch and determine that there is no blockage, restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.

3. If practical, close all building doors, windows and all doors between the space where the appliances remaining connected to the common venting system are located.

Turn on clothes dryers and any appliance 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. Place the appliance being inspected into operation. Adjust the thermostats so the appliance will operate continuously.

5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each appliance that remains connected to the common venting system properly vents (when tested as outlined above), return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.

7. If improper venting is observed during any of the above tests, the common venting system must be resized.

When the furnace is installed in the same space with other gas appliances such as a water heater, be sure there is an adequate supply of combustion and ventilation air for the other appliances. Do not delete or reduce the combustion air supply required by the other gas appliances in this space. See Z223.1, National Fuel Gas Code (NFPA54) for determining the combustion air requirements for gas appliances. An unconfined space must have at least 50 cubic feet (volume) for each 1,000 BTUH of the total input of all appliances in the space. If the open space containing the appliances is in a building with tight construction (contemporary construction), outside air may still be required for the appliances to burn and vent properly. Outside air openings should be sized the same as for a confined space.

IMPORTANT: Only the current vent instructions apply. All 90 Plus Gas Furnaces cannot be common vented.

**JOINING PIPE AND FITTINGS**

**WARNING**

PVC SOLVENT CEMENTS AND PRIMERS ARE HIGHLY FLAMMABLE. PROVIDE ADEQUATE VENTILATION AND DO NOT ASSEMBLE NEAR HEAT SOURCE OR AN OPEN FLAME. DO NOT SMOKE. AVOID SKIN OR EYE CONTACT. OBSERVE ALL CAUTIONS AND WARNINGS PRINTED ON MATERIAL CONTAINERS. FAILURE TO FOLLOW THESE GUIDELINES MAY RESULT IN FIRE, EXPLOSION OR ASPHYXIATION CAUSING PERSONAL INJURY OR DEATH.

All pipe, fittings, solvent cement, primers and procedures must conform to American National Standard Institute and American Society for Testing and Materials (ANSI/ASTM) standards as shown below:

**CEMENTING JOINTS**

Properly seal all joints in the PVC vent using the following materials and procedures.

PVC CLEANER-PRIMER AND PVC MEDIUM-BODY SOLVENT CEMENT

IMPORTANT: After cutting pipe, remove all ragged edges and burrs. This is important to prevent reduction in pressure drop throughout the system.

---

**PIPE & FITTING MATERIAL**

<table>
<thead>
<tr>
<th>Material Description</th>
<th>ASTM Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule 40 PVC (Pipe)</td>
<td>D1785</td>
</tr>
<tr>
<td>Schedule 40 PVC (Cellular Core Pipe)</td>
<td>F891</td>
</tr>
<tr>
<td>Schedule 40 PVC (Fittings)</td>
<td>D2466</td>
</tr>
<tr>
<td>SDR-21 PVC (Pipe)</td>
<td>D2241</td>
</tr>
<tr>
<td>SDR-26 PVC (Pipe)</td>
<td>D2241</td>
</tr>
<tr>
<td>Schedule 40 ABS Cellular Core DWV (Pipe)</td>
<td>F628</td>
</tr>
<tr>
<td>Schedule 40 ABS (Pipe)</td>
<td>D1527</td>
</tr>
<tr>
<td>Schedule 40 ABS (Fittings)</td>
<td>D2468</td>
</tr>
<tr>
<td>ABS-DWV (Drain Waste &amp; Vent) (Pipe &amp; Fittings)</td>
<td>D2661</td>
</tr>
<tr>
<td>PVC-DWV (Drain Waste &amp; Vent) (Pipe &amp; Fittings)</td>
<td>D2665</td>
</tr>
</tbody>
</table>

---

1. Cut pipe end square. Chamfer edge of pipe. Clean fitting socket and pipe joint area of all dirt, grease and moisture.

2. After checking pipe and socket for proper fit, wipe socket and pipe with cleaner-primer. Apply a liberal coat of primer to inside surface of socket and outside of pipe. Read instructions included with the primer for proper application.

3. Apply a thin coat of cement evenly in the socket. Quickly apply a heavy coat of cement to the pipe end and insert pipe into fitting with a slight twisting movement until it bottoms out.

NOTE: Cement must be fluid; if not, recoat.

4. Hold the pipe in the fitting for 30 seconds to prevent the tapered socket from pushing the pipe out of the fitting.

5. Wipe all excess cement from the joint with a rag. Allow 15 minutes before handling. Cure time varies according to fit, temperature and humidity.

NOTE: Stir the solvent cement frequently while using. Use a natural bristle brush or the dauber supplied with the can. The proper brush size is one inch.

IMPORTANT: For Proper Installation

DO NOT use solvent cement that has become curdled, lumpy or thickened.

DO NOT thin. Observe shelf precautions printed on containers.

For application below 32°F, use only low-temperature-type solvent cement.
COMBUSTION AND VENTILATION AIR

NON-DIRECT FURNACE INSTALLATIONS

⚠️ WARNING ⚠️

THE FURNACE AND ANY OTHER FUEL-BURNING APPLIANCE MUST BE PROVIDED WITH ENOUGH FRESH AIR FOR PROPER COMBUSTION AND VENTILATION OF THE FLUE GASES. MOST HOMES WILL REQUIRE THAT OUTSIDE AIR BE SUPPLIED INTO THE FURNACE AREA. FAILURE TO DO SO CAN CAUSE PERSONAL INJURY OR DEATH FROM CARBON MONOXIDE POISONING.

Adequate facilities for providing air for combustion and ventilation must be provided in accordance with section 5.3, “Air for Combustion and Ventilation” of the National Fuel Gas Code, ANSI Z223.1 (latest edition) or applicable provisions for the local building codes, and not obstructed so as to prevent the flow of air to the furnace.

IMPORTANT: Air for combustion and ventilation must not come from a corrosive atmosphere. Any failure due to corrosive elements in the atmosphere is excluded from warranty coverage.

The following types of installation (but not limited to the following) will require OUTDOOR AIR for combustion, due to chemical exposures:

- Commercial buildings
- Buildings with indoor pools
- Furnaces installed in laundry rooms
- Furnaces in hobby or craft rooms
- Furnaces installed near chemical storage areas.

Exposure to the following substances in the combustion air supply (but not limited to the following) will also require OUTDOOR AIR for combustion:

- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Cements and glues
- Antistatic fabric softeners for clothes dryers
- Masonry curing and acid washing materials

Combustion air must be free of acid-forming chemicals such as sulphur, fluorine and chlorine. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, air fresheners, paint and varnish removers, refrigerants and many other commercial and household products. When burned in a gas flame, vapors from these products form acid compounds. The acid compounds increase the dew point temperature of the flue products and are highly corrosive after they condense.

⚠️ IMPORTANT ⚠️

A INDOOR AIR FOR COMBUSTION

IMPORTANT: Air should not be taken from a heated space with a fireplace, exhaust fan or other device that may produce a negative pressure.

If combustion air is taken from the heated area, the openings must each have at least 100 square inches of free area. Each opening must have at least one square inch of free area for each 1,000 BTUH of total input in the space. Here are some examples of typical openings required.

### COMBUSTION AND VENTILATION AIR

<table>
<thead>
<tr>
<th>BTUH Input</th>
<th>Minimum Sq. Feet With 8' Ceiling</th>
<th>Typical Room Size With 8' Ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>45,000</td>
<td>281</td>
<td>14' x 20' OR 16' x 18'</td>
</tr>
<tr>
<td>60,000</td>
<td>375</td>
<td>15' x 25' OR 19' x 20'</td>
</tr>
<tr>
<td>75,000</td>
<td>469</td>
<td>15' x 31' OR 20' x 24'</td>
</tr>
<tr>
<td>90,000</td>
<td>563</td>
<td>20' x 28' OR 24' x 24'</td>
</tr>
<tr>
<td>105,000</td>
<td>657</td>
<td>20' x 33' OR 26' x 25'</td>
</tr>
<tr>
<td>120,000</td>
<td>750</td>
<td>25' x 30' OR 24' x 32'</td>
</tr>
</tbody>
</table>

If the open space containing the furnace is in a building with tight construction, outside air may still be required for the furnace to operate and vent properly. Outside air openings should be sized the same as for a confined space.

### EXAMPLE 2:
FURNACE LOCATED IN A CONFINED SPACE

A confined space (any space smaller than shown above as “unconfined”) must have openings into the space which are located in accordance with the requirements set forth in the following subsections A and B. Size the openings by how they are connected to the heated area or to the outside, and by the input of all appliances in the space.

If confined space is within a building with tight construction, combustion air must be taken from outdoors or area freely communicating with the outdoors.

A. USING INDOOR AIR FOR COMBUSTION

IMPORTANT: Air should not be taken from a heated space with a fireplace, exhaust fan or other device that may produce a negative pressure.

If combustion air is taken from the heated area, the openings must each have at least 100 square inches of free area. Each opening must have at least one square inch of free area for each 1,000 BTUH of total input in the space. Here are some examples of typical openings required.

### EXAMPLE 1:
FURNACE LOCATED IN AN UNCONFINED SPACE

Using indoor air for combustion.

An unconfined space must have at least 50 cubic feet for each 1,000 BTUH of the total input for all appliances in the space. Here are a few examples of the room sizes required for different inputs. The sizes are based on 8-foot ceilings.
B. USING OUTDOOR AIR FOR COMBUSTION

IMPORTANT: Do not take air from an attic space that is equipped with power ventilation.

The confined space must communicate with the outdoors in accordance with Methods 1 or 2. The minimum dimension of air openings shall not be less than 3 inches. Where ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect.

Method 1
Two permanent openings, one located within 12 inches of the top and one located within 12 inches of the bottom of the enclosure, shall be provided. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

a. Where directly communicating with the outdoors or where

<table>
<thead>
<tr>
<th>BTUH Input</th>
<th>Free Area Each Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>45,000</td>
<td>100 square inches</td>
</tr>
<tr>
<td>60,000</td>
<td>100 square inches</td>
</tr>
<tr>
<td>75,000</td>
<td>100 square inches</td>
</tr>
<tr>
<td>90,000</td>
<td>100 square inches</td>
</tr>
<tr>
<td>105,000</td>
<td>105 square inches</td>
</tr>
<tr>
<td>120,000</td>
<td>120 square inches</td>
</tr>
</tbody>
</table>

Communicating to the outdoors through vertical ducts as shown in Figure 12, each opening shall have a minimum free area of 1 square inch for each 4,000 BTUH of total appliance input rating in the enclosure.

<table>
<thead>
<tr>
<th>BTUH Input</th>
<th>Free Area Each Opening</th>
<th>Round Pipe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>45,000</td>
<td>11.25 square inches</td>
<td>4&quot;</td>
</tr>
<tr>
<td>60,000</td>
<td>15.00 square inches</td>
<td>5&quot;</td>
</tr>
<tr>
<td>75,000</td>
<td>18.75 square inches</td>
<td>5&quot;</td>
</tr>
<tr>
<td>90,000</td>
<td>22.50 square inches</td>
<td>6&quot;</td>
</tr>
<tr>
<td>105,000</td>
<td>26.25 square inches</td>
<td>6&quot;</td>
</tr>
<tr>
<td>120,000</td>
<td>30.00 square inches</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

b. Where communicating with outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch for each 2,000 BTUH of total input rating of all equipment in the enclosure (see Figure 13).

Here are some typical sizes:

<table>
<thead>
<tr>
<th>BTUH Input</th>
<th>Free Area Each Opening</th>
<th>Round Pipe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>45,000</td>
<td>22.50 square inches</td>
<td>6&quot;</td>
</tr>
<tr>
<td>60,000</td>
<td>30.00 square inches</td>
<td>6&quot;</td>
</tr>
<tr>
<td>75,000</td>
<td>37.50 square inches</td>
<td>7&quot;</td>
</tr>
<tr>
<td>90,000</td>
<td>45.00 square inches</td>
<td>8&quot;</td>
</tr>
<tr>
<td>105,000</td>
<td>52.50 square inches</td>
<td>8&quot;</td>
</tr>
<tr>
<td>120,000</td>
<td>60.00 square inches</td>
<td>9&quot;</td>
</tr>
</tbody>
</table>
Method 2 (not shown)
One permanent opening, located within 12 inches of the top of the enclosure, shall be permitted where the equipment has clearances of at least 1 inch from the sides and back and 6 inches from the front of the appliance. The opening shall directly communicate with the outdoors or communicate through a vertical or horizontal duct to the outdoors or spaces (crawl or attic) that freely communicate with the outdoors, and shall have a minimum free area of:

a. 1 square inch for each 3,000 BTUH of the total input rating of all equipment located in the enclosure and

<table>
<thead>
<tr>
<th>BTUH Input</th>
<th>Free Area</th>
<th>Round Pipe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>45,000</td>
<td>15.00 square inches</td>
<td>4&quot;</td>
</tr>
<tr>
<td>60,000</td>
<td>16.67 square inches</td>
<td>5&quot;</td>
</tr>
<tr>
<td>75,000</td>
<td>25.00 square inches</td>
<td>6&quot;</td>
</tr>
<tr>
<td>90,000</td>
<td>30.00 square inches</td>
<td>6&quot;</td>
</tr>
<tr>
<td>105,000</td>
<td>35.00 square inches</td>
<td>7&quot;</td>
</tr>
<tr>
<td>120,000</td>
<td>40.00 square inches</td>
<td>7&quot;</td>
</tr>
</tbody>
</table>

b. Not less than the sum of the areas of all vent connectors in the confined space.

If unit is installed where there is an exhaust fan, sufficient ventilation must be provided to prevent the exhaust fan from creating a negative pressure.

Combustion air openings must not be restricted in any manner.

---

**FIGURE 14**
COMBUSTION AIR FITTING

**UPFLOW**

ATTACH DOUBLE ELBOW TO TOP INLET AIR OPENING OR 90° ELBOW TO SIDE INLET AIR OPENING TO PREVENT ACCIDENTAL BLOCKAGE OF INTAKE OPENING. PLUG OPENING NOT USED.

**DOWNFLOW/HORIZONTAL**

ATTACH DOUBLE ELBOW TO INTAKE AIR COLLAR AND SECURE WITH TWO SHEET METAL SCREWS TO PREVENT ACCIDENTAL BLOCKAGE OF INTAKE AIR OPENING.

*NOTE: WHEN FURNACE IS INSTALLED IN A HORIZONTAL POSITION ONLY ONE 90° ELBOW IS REQUIRED. INSTALL THE ELBOW SO THE OPEN END IS POINTED DOWNWARD.*

**IMPORTANT:** When indoor combustion air is used, the inlet air opening at the furnace must be protected from accidental blockage. (See Figure 14).

CONSULT LOCAL CODES FOR SPECIAL REQUIREMENTS.

**CONNECTION TO FURNACE**

**Top Option**

COMBUSTION AIR

EXHAUST

**Side Option**

PREDRILL FOR SCREWS.

EXHAUST

ATTACH DOUBLE ELBOW TO INTAKE AIR COLLAR AND SECURE WITH TWO SHEET METAL SCREWS TO PREVENT ACCIDENTAL BLOCKAGE OF INTAKE AIR OPENING.
NON-DIRECT VENT INSTALLATION GUIDELINES

IMPORTANT: Failure to correctly follow all venting guidelines may result in erratic furnace operation, freeze-up of combustion air or exhaust air piping or sooting of the furnace.

All exhaust piping must be installed in compliance with Part 7, "Venting of Equipment," of the latest edition of the National Fuel Gas Code NFPA54/ ANSI Z223.1-, local codes or ordinances and these instructions.

1. Vertical piping is preferred.
2. All horizontal piping must slope upward a minimum of 1/4 inch per foot of run so that condensed drains toward the furnace.
3. All horizontal runs must be supported at least every 4 feet. No sags or dips are permitted.
4. IMPORTANT: Do not common vent with any other appliance. Do not install in the same chase or chimney with a metal or high temperature plastic pipe from another gas or fuel-burning appliance unless the required minimum clearances to combustibles are maintained between the PVC pipe and other pipes.
5. All vent runs through unconditioned spaces where below freezing temperatures are expected should be insulated with 1-in. thick, medium-density, foil-faced fiberglass. An equivalent "arm-a-flex" or "rub-a-tex" insulation may also be used as long as there is no heat tape applied to the vent pipe. For horizontal runs where water may collect, wrap the vent pipe with self-regulating 3 or 5 watt heat tape. The heat tape must be U.L. listed and installed per the manufacturer's instructions.
6. The minimum vent pipe length is 5 feet with 15" between elbows.
7. Extend the exhaust pipe a minimum of 18" from the cabinet before turning vent.
8. Vent cannot be run underground.

| FIGURE 15 | TEE TERMINAL – FOR STANDARD HORIZONTAL NON-DIRECT INSTALLATION |

| TABLE 1 | UPFLOW UNITS | FOR NON-DIRECT VENT APPLICATIONS - AIR FOR COMBUSTION PROVIDED FROM INDOORS |

MAXIMUM ALLOWABLE LENGTH IN FEET OF EACH EXHAUST PIPE AND INTAKE PIPE

<table>
<thead>
<tr>
<th>FURNACE INPUT</th>
<th>PIPE SIZE</th>
<th>TERMINATION</th>
<th>NUMBERS OF ELBOWS 45° OR 90°</th>
<th>MEDIAN / LONG RADIUS ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-2</td>
<td>3-4</td>
</tr>
<tr>
<td>45,000</td>
<td>2&quot;</td>
<td>Standard</td>
<td>60</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>55</td>
<td>50</td>
</tr>
<tr>
<td>60,000</td>
<td>2&quot;</td>
<td>Standard</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>75,000</td>
<td>3&quot;</td>
<td>Standard</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>90,000</td>
<td>3&quot;</td>
<td>Standard</td>
<td>90</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>105,000</td>
<td>3&quot;</td>
<td>Standard</td>
<td>45</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>45</td>
<td>40</td>
</tr>
<tr>
<td>120,000</td>
<td>3&quot;</td>
<td>Standard</td>
<td>70</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>40</td>
<td>30</td>
</tr>
</tbody>
</table>

NOTES:
1. N.R. - NOT RECOMMENDED.
2. MAXIMUM OF 4 ELBOWS MAY BE USED. DO NOT COUNT ELBOWS REQUIRED FOR ALTERNATE TERMINATION. USE ONLY MEDIUM OR LONG SWEEP ELBOWS.
3. A 45 OR 22.5 DEGREE ELBOW IS CONSIDERED ONE ELBOW.
4. NO SCREENS MAY BE USED TO COVER EXHAUST.

| TABLE 2 | DOWNFLOW/HORIZONTAL UNITS | FOR NON-DIRECT VENT APPLICATIONS - AIR FOR COMBUSTION PROVIDED FROM INDOORS |

MAXIMUM ALLOWABLE LENGTH IN FEET OF EACH EXHAUST PIPE AND INTAKE PIPE

<table>
<thead>
<tr>
<th>FURNACE INPUT</th>
<th>PIPE SIZE</th>
<th>TERMINATION</th>
<th>NUMBERS OF ELBOWS 45° OR 90°</th>
<th>MEDIAN / LONG RADIUS ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-2</td>
<td>3-4</td>
</tr>
<tr>
<td>60,000</td>
<td>2&quot;</td>
<td>Standard</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>75,000</td>
<td>3&quot;</td>
<td>Standard</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>90,000</td>
<td>3&quot;</td>
<td>Standard</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>105,000</td>
<td>3&quot;</td>
<td>Standard</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate</td>
<td>50</td>
<td>40</td>
</tr>
</tbody>
</table>

NOTES:
1. N.A. - NOT APPLICABLE.
2. MAXIMUM OF 4 - 90 DEGREE ELBOWS MAY BE USED. DO NOT COUNT ELBOWS REQUIRED FOR ALTERNATE TERMINATION. USE ONLY MEDIUM OR LONG SWEEP ELBOWS.
3. A 45 OR 22.5 DEGREE ELBOW IS CONSIDERED ONE ELBOW.
4. NO SCREENS MAY BE USED TO COVER EXHAUST.

* A = 17-1/2" CABINET WIDTH  B = 21" CABINET WIDTH

ELEVATED SINGLE PIPE ALTERNATE TEE TERMINATION

See Figure 16. The tee termination may be elevated up to 24 inches above the wall penetration if required for anticipated snow levels. Use 2 long-sweep, 2-in. PVC elbows and 2-in. PVC pipe, attaching the tee so it is 12 inches from the wall.
STANDARD INSTALLATIONS
The single-pipe system requires an exhaust pipe only. Combustion air may be taken from the furnace installation area or ducted to the furnace area from the outside.

Size the exhaust pipe as specified in Tables 1 and 2. These tables list the maximum allowable length in feet of the exhaust pipe that may be used for all furnace inputs as related to the number of elbows required and the termination.

Vertical through-the-roof installations do not require a vent termination. Use 2-in. PVC pipe extending a minimum of 12 inches above the anticipated level of snow accumulation. See exhaust pipe requirements, Figure 20. When 3-in. vent pipe is used from furnace to the roof, reduce it to 2 inches before penetrating the roof. A maximum of 18 inches of 2-in. pipe may be used below the roof. Maximum exposed vent length above the roof line is 30”. Total 2” vent length is a maximum of 48”.

Horizontal vent terminations require a 2-in. PVC tee positioned 12 inches from the outside wall. See exhaust pipe requirements, Figures 20 and 21. When 3-in. pipe is used from the furnace to the outside wall, reduce it to 2 inches before penetrating the wall. A maximum of 18 inches of 2-in. pipe may be used inside the wall. An alternate termination may be used as shown in Figure 16 to clear anticipated snow levels. The tee may be raised up to 24 inches above the wall penetration. Use two long-sweep radius bend, 2-in. PVC elbows and a length of 2-in. PVC pipe so that the elbows are on 24-in. centers.

NOTE: Extend the exhaust a minimum of 18” from the furnace top plate before turning vent.

NON-DIRECT VENT TERMINATION LOCATION REQUIREMENTS

CAUTION

MOISTURE IN THE COMBUSTION PRODUCTS CONDENSES AS IT LEAVES THE TERMINATION. THIS CONDENSATE CAN FREEZE ON EXTERIOR WALLS, UNDER THE EAVES, AND ON SURROUNDING OBJECTS. SOME DISCOLORATION IS TO BE EXPECTED. HOWEVER, IMPROPER LOCATION OR INSTALLATION CAN CAUSE STRUCTURAL OR EXTERIOR FINISH DAMAGE TO THE BUILDING.

Non-direct venting location requirements are slightly different in some cases than direct venting. Install a non-direct vent with the following minimum clearances. See Figure 17.
1. Locate the bottom of the vent terminal at least 12 inches above grade. Increase the 12-in. minimum to keep the terminal openings above the level of snow accumulation, where applicable.
2. The vent shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard.
3. 4 feet below, 4 feet horizontally from, or 1 foot above any door, window soffit, under eave vent or gravity air inlet to the building.
4. The vent terminal shall have a minimum horizontal clearance of 4 feet from electric meters, gas meters, regulators and relief equipment.
5. 6 feet from an inside corner formed by two exterior walls – 10 feet is the recommended distance.
6. Locate it 3 feet above any forced air inlet located within 10 feet. Any fresh air or make-up air inlet, such as for a dryer or furnace area, is considered a forced air inlet.
7. Avoid areas where dripping condensate may cause problems, such as above planters, patios, or adjacent to windows where steam may cause fogging.

In addition to the minimum clearances listed above, the vent location should also be governed by the following guidelines.
1. Do not terminate under any kind of patio or deck. If running the vent under a deck, insulate it to insure no condensate freezes and blocks the pipe.
2. Do not locate on the side of a building with prevailing winter winds. This will help prevent moisture from freezing on walls and overhangs (under eaves).
3. Do not extend vent directly through brick or masonry surfaces. Use a rust-resistant sheet metal or plastic backing plate behind vent.
4. Do not locate too close to shrubs as condensate may stunt or kill them.
5. Minimum vertical clearances of 1 foot are recommended for overhangs up to 1 foot horizontal. The vertical clearance should be increased equally for each additional increase in horizontal overhang to a maximum vertical clearance of 6 feet.
6. Caulk all cracks, seams and joints within 6 feet horizontally and above and below vent.
7. Do not terminate in any area that may allow flue gases to stagnate.

FIGURE 16
ALTERNATE HORIZONTAL TERMINATION FOR NON-DIRECT VENT INSTALLATIONS

NOTE: NOT APPLICABLE TO RGRM-07EYBGS MODEL RGRM-07EMAES MODEL RGRM-10EZAJS MODEL
**FIGURE 17**

**OTHER THAN DIRECT VENT TERMINAL CLEARANCES**

<table>
<thead>
<tr>
<th>A</th>
<th>Clearance above grade, veranda, porch, deck, or balcony</th>
<th>Canadian Installations¹</th>
<th>US Installations²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 inches (30 cm)</td>
<td>12 inches (30 cm)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>Clearance to window or door that may be opened</th>
<th>6 inches (15 cm) for appliances ≤ 10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤ 100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt; 100,000 BTUH (30 kW)</th>
<th>4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>Clearance to permanently closed window</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>D</th>
<th>Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>E</th>
<th>Clearance to unventilated soffit</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>F</th>
<th>Clearance to outside corner</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>G</th>
<th>Clearance to inside corner</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>H</th>
<th>Clearance to each side of center line extended above meter/regulator assembly</th>
<th>3 feet (91 cm) within a height 15 feet above the meter/regulator assembly</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>I</th>
<th>Clearance to service regulator vent outlet</th>
<th>3 feet (1.83 m)</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>K</th>
<th>Clearance to a mechanical air supply inlet</th>
<th>6 feet (1.83 m)</th>
<th>3 feet (91 cm) above if within 10 feet (3 m) horizontally</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>L</th>
<th>Clearance above paved sidewalk or paved driveway located on public property</th>
<th>7 feet (2.13 m) †</th>
<th>7 feet (2.13 m)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>M</th>
<th>Clearance under veranda, porch deck, or balcony</th>
<th>12 inches (30 cm) †</th>
<th>-</th>
</tr>
</thead>
</table>

¹ In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code

² In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code

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

† Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

* For clearances not specified in ANSI Z223.1 / NFPA 54 or CAN/CGA-B149, one of the following shall be indicated:

  a) A reference to the following footnote:

  "Clearance in accordance with local installation codes, the requirements of the gas supplier and the manufacturer's installation instructions."
**DIRECT VENT INSTALLATIONS**

**WARNING**

READ AND FOLLOW ALL INSTRUCTIONS IN THIS SECTION. FAILURE TO PROPERLY VENT THIS FURNACE CAN CAUSE CARBON MONOXIDE POISONING OR AN EXPLOSION OR FIRE, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

Direct vent installations require a dedicated combustion air and venting system. All air for combustion is taken from the outside atmosphere and all combustion products are discharged to the outdoors. Therefore, no ventilation or combustion air openings are required.

**INSTALLATION GUIDELINES**

All exhaust piping must be installed in compliance with Part 7, “Venting of Equipment,” of the latest edition of the National Fuel Gas Code NFPA54/ANSI Z223.1-, local codes or ordinances and these instructions.

1. Vertical piping is preferred.
2. All horizontal piping must slope upward a minimum of 1/4 inch per foot of run so that condensate drains toward the furnace.
3. All horizontal runs must be supported at least every 4 feet. No sags or drips are permitted.
4. **IMPORTANT:** Do not common vent with any other appliance. Do not install in the same chase or chimney with a metal or high temperature plastic pipe from another gas or fuel-burning appliance unless the required minimum clearances to combustibles are maintained between the PVC pipe and other pipes. Minimum 3 ft. clearance required between combustion air inlet and any other exhaust.
5. For horizontal runs where water may collect, wrap the vent pipe with self-regulating 3 or 5 watt heat tape. The heat tape must be U.L. listed and installed per the manufacturer’s instructions.
6. The minimum, pipe length is 5 feet for combustion air and exhaust.
7. Do not install elbows back to back. Allow at least 15” between elbows.

Size the exhaust and combustion air intake pipes as specified in Tables 3 and 4. These tables list the maximum allowable length in feet of each exhaust pipe and intake air pipe.

### TABLE 3

**UPFLOW UNITS FOR DIRECT VENT APPLICATIONS - AIR FOR COMBUSTION PROVIDED FROM OUTDOORS**

<table>
<thead>
<tr>
<th>FURNACE INPUT SIZE</th>
<th>TERMINATION</th>
<th>VENT TERMINATION KIT RECOMMENDED</th>
<th>NUMBER OF ELBOWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>45,000 2&quot; Standard/Concentric</td>
<td>RXGY-D02/RXGY-D02A</td>
<td>RXGY-D02/RXGY-D02A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
<tr>
<td>60,000 2&quot; Standard/Concentric</td>
<td>RXGY-D02/RXGY-D02A</td>
<td>RXGY-D02/RXGY-D02A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
<tr>
<td>75,000 3&quot; Standard/Concentric</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
<tr>
<td>90,000 3&quot; Standard/Concentric</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
<tr>
<td>105,000 3&quot; Standard/Concentric</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
</tbody>
</table>

**NOTES:**
1. N.A. - NOT APPLICABLE
2. MAXIMUM OF 4 ELBOWS MAY BE USED. DO NOT COUNT ELBOWS IN ALTERNATE TERMINATION KIT. MEDIUM OR LONG SWEEP ELBOWS MAY BE USED.
3. A 45 DEGREE ELBOW IS CONSIDERED ONE ELBOW.
4. CONCENTRIC TERMINATION NO. RXGY-E03/RXGY-E03A IS FOR THRU-THE-ROOF OR THRU-THE-WALL VENTING.
5. USE KITS RXGY-D02/D02A (2”), RXGY-G02 (2”), OR RXGY-D03/D03A (3”) FOR STANDARD OR ALTERNATE THRU-THE-WALL VENTING.
6. USE KITS RXGY-D04/D04A FOR ALTERNATE VENTING OF 120,000 BTUH UNITS WITH LONG RUNS.
7. KIT NUMBERS CONTAINING SUFIX “A” ARE APPROVED FOR INSTALLATION IN CANADA.
8. NO SCREENS MAY BE USED TO COVER COMBUSTION AIR AND EXHAUST.

### TABLE 4

**DOWFLOW/HORIZONTAL UNITS FOR DIRECT VENT APPLICATIONS - AIR FOR COMBUSTION PROVIDED FROM OUTDOORS**

<table>
<thead>
<tr>
<th>FURNACE INPUT SIZE</th>
<th>TERMINATION</th>
<th>VENT TERMINATION KIT RECOMMENDED</th>
<th>NUMBER OF ELBOWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>60,000 2&quot; Standard/Concentric</td>
<td>RXGY-D02/RXGY-D02A</td>
<td>RXGY-D02/RXGY-D02A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
<tr>
<td>75,000 3&quot; Standard/Concentric</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
<tr>
<td>90,000 3&quot; Standard/Concentric</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
<tr>
<td>105,000 3&quot; Standard/Concentric</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>RXGY-D03/RXGY-D03A</td>
<td>1 - 2 - 3 - 4</td>
</tr>
</tbody>
</table>

**NOTES:**
1. N.A. - NOT APPLICABLE
2. MAXIMUM OF 4 ELBOWS MAY BE USED. DO NOT COUNT ELBOWS IN ALTERNATE TERMINATION KIT. MEDIUM OR LONG SWEEP ELBOWS MAY BE USED.
3. A 45 DEGREE ELBOW IS CONSIDERED ONE ELBOW.
4. CONCENTRIC TERMINATION NO. RXGY-E03/RXGY-E03A IS FOR THRU-THE-ROOF OR THRU-THE-WALL VENTING.
5. USE KITS RXGY-D02/D02A (2”), RXGY-G02 (2”), OR RXGY-D03/D03A (3”) FOR STANDARD OR ALTERNATE THRU-THE-WALL VENTING.
6. USE KITS RXGY-D04/D04A FOR ALTERNATE VENTING OF 120,000 BTUH UNITS WITH LONG RUNS.
7. KIT NUMBERS CONTAINING SUFIX “A” ARE APPROVED FOR INSTALLATION IN CANADA.
8. NO SCREENS MAY BE USED TO COVER COMBUSTION AIR AND EXHAUST.
allowable length in feet of the exhaust and combustion air intake pipes that may be used for all furnace inputs as related to the number of elbows required and the termination.

**NOTE:** Extend the exhaust a minimum of 18" from the furnace top plate before turning vent.

8. The maximum exposed vent length (above the roof line) is 30".

**COMBUSTION AIR FOR DIRECT VENT INSTALLATIONS**

**THE COMBUSTION AIR SYSTEM DESIGNED FOR THIS FURNACE MUST BE USED.**

When this furnace is installed as a direct vent forced air furnace, all combustion air is supplied directly to the burner through a special air inlet system outlined in these instructions. This system consists of field-supplied Schedule 40 or 26 SDR-PVC pipe and one of the following horizontal vent termination kits: RXGY-D02/D02A, RXGY-D03/D03A, RXGY-D04/D04A, or RXGY-E03A. Kits ending with an “A” meet Canadian ULC-5636 requirements.

**NOTE:** Schedule 40 ABS-DWV pipe and fittings may be used as an alternate to PVC pipe for the combustion air inlet and vent pipes.

The combustion air for this furnace is supplied directly from the outdoors through the combustion air inlet system.

When the furnace is installed in the same space with other gas appliances, such as a water heater, be sure there is an adequate supply of combustion and ventilation air for the other appliances. Do not delete or reduce the combustion air supply required by the other gas appliances in this space. See Z223.1, National Fuel Gas Code (NFPA54) for determining the combustion air requirements for gas appliances. An unconfined space must have at least 50 cubic feet (volume) for each 1,000 BTUH of the total input of all appliances in the space. If the open space containing the appliances is in a building with tight construction (contemporary construction), outside air may still be required for the appliances to burn and vent properly. Outside air openings should be sized the same as for a confined space.

**STANDARD TERMINATIONS**

**STANDARD TERMINATIONS**

**COMBUSTION AIR PIPING**

Use two medium-radius sweep elbows to keep the inlet downward to prevent entry of rain. See Figure 20 for the proper relationship of combustion air to exhaust termination.

**STANDARD HORIZONTAL TERMINATIONS**

**COMBUSTION AIR PIPING**

When 3-in. pipe is used between the furnace and outside wall, reduce it to 2 inches before penetrating the wall. Up to 18 inches of 2-in. pipe may be used inside the wall.

The standard horizontal intake air termination for all models is a 2-in. PVC coupling with a wind deflector vane (provided) attached. Cut a 2 1/4-in. length of 2-in. PVC pipe. Connect this pipe and another 2-in. PVC coupling to the coupling at the wall. The outer coupling must terminate 4 inches from the wall.

**IMPORTANT:** To ensure proper furnace operation, the supplied vane must be installed in the vertical position with PVC solvent as shown in Figure 21, Detail B.

The combustion air inlet terminal must be located with respect to the exhaust terminal as shown in Figure 21, Detail C.

**IMPORTANT:** All furnaces with horizontal air intakes, except those using concentric vent kit RXGY-E03/E03A, must have a drain tee assembly and trap installed as close to the furnace as possible. This is to drain any water that may be in the combustion air pipe to prevent it from entering the furnace combustion chamber.

These parts are included in kits RXGY-D02/D02A (for 2-in. pipe), RXGY-D03/D03A (for 3-in. pipe) and RXGY-D04/D04A (special for the 120,000 BTUH furnace installed with the alternate horizontal termination). Attach the trap to the bottom of the tee with PVC solvent. Connect the other end to a suitable drain, as to the downstream of a condensate trap on the furnace.

**STANDARD VERTICAL TERMINATIONS**

**EXHAUST VENT PIPING**

Vertical through-the-roof vent applications do not require an exhaust terminal. The exhaust vent must terminate at least 12 inches above the combustion intake air termination. The exhaust vent for models with inputs of 45,000 through 120,000 BTUH is 2-in. PVC pipe. 120,000 BTUH models with excessively long runs require 2 1/2". Refer to Tables 3 and 4 for proper application. This must be reduced to 1 1/4" the last 12 inches for models with inputs of 45,000 through 75,000 BTUH. See Figure 20.

**STANDARD HORIZONTAL TERMINATIONS**

**EXHAUST PIPING**

For direct vent systems the standard termination is 2-in. PVC pipe extending 12 inches from the wall for furnaces with inputs from 105,000 to 120,000 BTUH. Install a 2-in. coupling at the outside wall to prevent the termination from being pushed inward. When 3-in. pipe is used between the furnace and outside wall, reduce to 2 inches before penetrating the wall. The standard termination is 2-in. PVC pipe extending outward 12 inches from the wall. See Figure 20, Detail A.

The combustion air and exhaust terminations must be at least 12 inches above grade and must be oriented with respect to each other as shown in Figure 21, Detail B. Refer to section on alternate venting options when higher snow levels are anticipated.

**ALTERNATE TERMINATIONS**

**ALTERNATE HORIZONTAL DIRECT VENT TERMINATIONS**

RXGY-D02/D02A, -D03/D03A AND -D04/D04A

The exhaust termination may be raised a maximum of 60 inches above the wall penetration to maintain the required 12 inch clearance above grade or snow level. See Figure 18. Size the pipe length according to Tables 3 and 4.

Review the following guidelines:

- Size the entire vent system according to the alternate, not standard, termination shown in Tables 3 and 4.

25
• Insulate the entire length of vent pipe, between the elbow where the pipe exits the wall and the elbow where the termination is made, with a closed-cell insulation, such as “Arm-a-Flex” or “Rub-a-Tex” with a minimum of 1/2" thickness.

• All elbows installed on the exterior of the building must be of the long sweep nature.

• As required for the horizontal piping run within the structure, any pipe run horizontal outside the structure must slope upward a minimum of 1/4" per foot run so that condensate drains toward the furnace.

From the top elbow in the exhaust pipe, extend a length of PVC pipe outward so that it terminates exactly 12 inches from the wall. See Figure 18.

The 45,000 BTUH unit only uses kit RXGY-D02/D02A. The 60,000 BTUH and 75,000 BTUH units may use kits RXGY-D02/D02A or RXGY-D03/D03A depending on pipe lengths and number of elbows. Use kit RXGY-D03/D03A with 90,000 BTUH through 120,000 BTUH units. The RXGY-D04/D04A kit only applies to the 120,000 BTUH unit using an alternate termination and excessively long runs. See Tables 3 and 4.

The following are parts lists for the RXGY-D02/D02A, RXGY-D03/D03A and RXGY-D04/D04A alternate horizontal direct vent termination kits:

**RXGY-D02/D02A**
1. 2-in. tee with reducer assembly
2. 1/2-in. PVC 6-in. dia. trap
3. PVC vane
4. 2-in. PVC elbow
5. PVC strap
6. vent template

**RXGY-D03/D03A**
1. 3-in. tee with reducer assembly
2. 1/2-in. PVC 6-in. dia. trap
3. PVC vane
4. 2-in. PVC elbow
5. PVC strap
6. vent template

**RXGY-D04/D04A**
1. 21/2-in. PVC elbow
2. 3" x 21/4" PVC bushing
3. 21/2" x 61/2" long PVC pipe
4. 21/2" x 16" long PVC pipe
5. 21/2" x 21" long PVC pipe
6. PVC vane
7. 3-in. tee with reducer assembly
8. 6-in. dia. 1/2-in. PVC trap
9. PVC strap
10. vent template

**NOTE:** The RXGY-D04/D04A kit only applies to the 120,000 BTUH unit using an alternate termination and excessively long runs.
CONCENTRIC TERMINATIONS

VERTICAL/HORIZONTAL CONCENTRIC VENT
KIT NO. RXGY-E03A

This kit is for vertical/horizontal intake air/vent runs and may be installed through roofs or sidewalls. One 5" diameter hole is required for the installation. See Figure 19 for the general layout. Complete installation instructions are included with the kit.

NOTE: The following IPEX brand concentric termination (System 636) may be purchased in the field and used in place of factory supplied kits:
3" Concentric Kit – Item # 196006

FIGURE 19
CONCENTRIC VENT KIT NO. RXGY-E03A

SIDEWALL ASSEMBLY

ITEM No. DESCRIPTION
A 2.5" PVC PIPE SCHEDULE 40 -- 37.125" LONG
B 4" PVC PIPE SCHEDULE 40 -- 24" LONG
C 3" x 3" x 4" SPECIAL CONCENTRIC FITTING
D 3" x 45° STREET ELBOW (FIELD SUPPLIED)
E PVC RAINCAP

NOTE: • Support must be field installed to secure termination kit to structure.
• No screens may be used to cover combustion air and exhaust.

ROOF INSTALLATION

MAINTAIN 12 IN. MINIMUM CLEARANCE ABOVE HIGHEST ANTICIPATED SNOW LEVEL. MAXIMUM OF 24 IN. ABOVE ROOF.
FIGURE 20
STANDARD VERTICAL DIRECT VENTING

NOTES:
1. INCREASE THE 12-IN. MINIMUM TO KEEP TERMINAL OPENING ABOVE ANTICIPATED LEVEL OF SNOW ACCUMULATION WHERE APPLICABLE.
2. WHEN 3-IN. DIAM. PIPE IS USED REDUCE TO 2-IN. DIAMETER BEFORE PENETRATING ROOF. A MAXIMUM OF 18 IN. OF 2-IN. PIPE MAY BE USED BEFORE PASSING THROUGH ROOF.
3. SUPPORT VERTICAL PIPE EVERY 6 FEET.
4. EXHAUST TERMINATION - TERMINATE THE LAST 12 INCHES WITH 2" PVC PIPE ON 45,000 AND 120,000 BTUH MODELS. SEE DETAIL A.
5. 30" MAXIMUM EXPOSED VENT LENGTH.
6. THE COMBUSTION AIR PIPE MUST TERMINATE IN THE SAME PRESSURE ZONE AS THE EXHAUST PIPE.
7. NO SCREENS MAY BE USED TO COVER COMBUSTION AIR AND EXHAUST.

FIGURE 21
STANDARD HORIZONTAL DIRECT VENTING

NOTES:
1. SUPPORT HORIZONTAL PIPE EVERY FOUR FEET.
2. WHEN 3 IN. PIPE IS USED REDUCE TO 2 IN. BEFORE PENETRATING OUTSIDE WALL.
3. 18 IN. MAXIMUM. 2 IN. DIAMETER PIPE MAY BE USED INSIDE THE WALL.
4. DETAIL "A" - EXHAUST TERMINATION TERMINATE THE LAST 12 INCHES WITH 2" PVC PIPE ON 45,000 AND 120,000 BTUH MODELS.
5. INCREASE THE 12 IN. MINIMUM ABOVE GRADE TO KEEP TERMINAL OPENINGS ABOVE ANTICIPATED LEVEL OF SNOW ACCUMULATION WHERE APPLICABLE. DETAIL "B". INSTALL WIND DEFLECTOR VANE IN 2 IN. PVC COUPLING IN VERTICAL POSITION USING PVC SOLVENT.
6. THE COMBUSTION AIR TERMINATION MUST BE IN THE SAME PRESSURE ZONE AS THE EXHAUST TERMINATION.
7. THE COMBUSTION AIR PIPE MUST TERMINATE IN THE SAME PRESSURE ZONE AS THE EXHAUST PIPE.
8. NO SCREENS MAY BE USED TO COVER COMBUSTION AIR AND EXHAUST.
9. NO ELBOWS OR "T"S CAN BE INSTALLED AT TERMINATION.
LOCATION REQUIREMENTS
HORIZONTAL DIRECT VENTS

^ CAUTION ^

THE COMBUSTION PRODUCTS AND MOISTURE IN THE FLUE GASES WILL CONDENSE AS THEY LEAVE THE TERMINATION. THE CONDENSATE CAN FREEZE ON THE EXTERIOR WALL, UNDER THE EAVES AND ON SURROUNDING OBJECTS. SOME DISCOLORATION TO THE EXTERIOR OF THE BUILDING IS TO BE EXPECTED. HOWEVER, IMPROPER LOCATION OR INSTALLATION CAN RESULT IN STRUCTURAL OR EXTERIOR FINISH DAMAGE TO THE BUILDING AND MAY RECIRCULATE PRODUCTS OF COMBUSTION INTO THE COMBUSTION AIR TERMINAL AND FREEZE.

The vent must be installed with the following minimum clearances. See Figures 22 and 23.

1. The bottom of the vent terminal and the air inlet shall be located at least 12 inches above grade. Increase the 12-in. minimum to keep the terminal openings above the level of snow accumulation, where applicable.

2. The vent shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard.

3. The vent terminal shall be located at least one foot from any opening through which flue gases could enter a building.

4. The vent terminal shall be at least 3 feet above any forced air inlet located within 10 feet, except the combustion air inlet of a direct vent appliance.

5. The vent terminal shall have a minimum horizontal clearance of 4 feet from electric meters, gas meters, regulators and relief equipment.

6. Locate the furnace combustion air inlet minimum of 3 feet from the vent of any other gas or fuel burning appliance or clothes dryer to prevent recirculation of the flue gases into the furnace combustion air inlet. The only exception to this requirement is the case of multiventing two or more furnaces, which is covered in the section on multiventing in these instructions.

In addition to the minimum clearances listed above, the vent location should also be governed by the following guidelines.

1. Do not terminate under any kind of patio or deck. If running the vent under a deck, insulate it to insure no condensate freezes and blocks the pipe.

2. Do not terminate behind any area that may allow the flue products to become stagnant and recirculate.

3. Do not locate on the side of a building with prevailing winter winds. This will help prevent moisture from freezing on walls and overhangs (under eaves).

4. Do not extend vent directly through brick or masonry surfaces. Use a rust-resistant sheet metal or plastic backing plate behind vent.

5. Do not locate too close to shrubs as condensate may stunt or kill them.

6. Minimum vertical clearances of 1 foot are recommended for overhangs up to 1 foot horizontal. The vertical clearance should be increased equally for each additional increase in horizontal overhang to a maximum vertical clearance of 6 feet.

7. Caulk all cracks, seams and joints within 6 feet horizontally and above and below vent.

8. Painted surfaces must be sound and in good condition with no cracking, peeling, etc. Painted surfaces will require maintenance.

9. Do not expose 3" x 2" reducer/bushing to outdoor ambient temperatures.

---

FIGURE 22

MOISTURE ZONES

\[ \text{CAUTION} \]

2 FT. SQ. SHEET METAL PLATE ON BRICK OR MASONRY SURFACE RECOMMENDED, BUT NOT REQUIRED BY CODE.
<table>
<thead>
<tr>
<th>Figure 23</th>
<th>Direct Vent Terminal Clearances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>Clearance above grade, veranda, porch, deck, or balcony</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Clearance to window or door that may be opened</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Clearance to permanently closed window</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>Clearance to unventilated soffit</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>Clearance to outside corner</td>
</tr>
<tr>
<td><strong>G</strong></td>
<td>Clearance to inside corner</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>Clearance to each side of center line extended above meter/ regulator assembly</td>
</tr>
<tr>
<td><strong>I</strong></td>
<td>Clearance to service regulator vent outlet</td>
</tr>
</tbody>
</table>

| **J** | Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance |
| **K** | Clearance to a mechanical air supply inlet |
| **L** | Clearance above paved sidewalk or paved driveway located on public property |
| **M** | Clearance under veranda, porch, deck, or balcony |

<table>
<thead>
<tr>
<th>Canadian Installations</th>
<th>US Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> 12 inches (30 cm)</td>
<td>12 inches (30 cm)</td>
</tr>
<tr>
<td><strong>B</strong> 6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
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<tr>
<td><strong>C</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
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<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
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<tr>
<td><strong>F</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
</tr>
<tr>
<td><strong>G</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
</tr>
<tr>
<td><strong>I</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
</tr>
<tr>
<td><strong>J</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
</tr>
<tr>
<td><strong>K</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances &gt; 10,000 BTUH (3 kW) and ≤100,000 BTUH (30 kW), 36 inches (91 cm) for appliances &gt;100,000 BTUH (30 kW)</td>
</tr>
</tbody>
</table>

1 In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code
2 In accordance with the current ANSI Z223.1 NFPA 54 National Fuel Gas Code
3 A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.
4 Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.
5 For clearances not specified in ANSI Z223.1 NFPA 54 or CAN/CGA-B149, one of the following shall be indicated:
a) A reference to the following footnote:
   “Clearance in accordance with local installation codes, the requirements of the gas supplier and the manufacturer's installation instructions.”
MULTIVENTING

IF VENTING TWO OR MORE FURNACES NEAR EACH OTHER IS REQUIRED, EACH FURNACE MUST BE INDIVIDUALLY VENTED – NO COMMON VENTING IS PERMITTED. See Figures 24 and 25 for positioning of the terminations. When more than two furnaces are to be vented, there must be at least 4 feet between the first two furnaces and the third, etc.
RXGY-G02 Side Wall Vent

This termination is for horizontal venting only.

**IMPORTANT:** Do not install on the prevailing winter wind side of the structure. Observe same clearance specified for horizontal, standard termination.

**NOTE:** Multi-venting-No common venting.

**NOTE:** Install the vent and air intake piping into the vent plate openings. Seal all gaps between the pipes and wall. **Be Sure To Use Silicone Sealant** to seal the vent pipe to the vent cap to permit field disassembly for annual inspection and cleaning. Also seal all pipe penetrations in wall. To prevent possibility of condensate freeze-up or recirculation, **do not install vent kits one above the other.**

**NOTE:** The vent illustration in Figure 27 can be used for non-direct vent terminations also.

**FIGURE 26**
VENT KIT INSTALLATION OPTIONS

**FIGURE 27**
TYPICAL INSTALLATIONS

For 45000 thru 120000 BTUH models-reduce to a length between 12 inches and 30 inches of 2 inch pipe.

Note: Vent should protrude a maximum of 2-1/4” beyond vent plate. air intake should protrude a maximum of 1 inch beyond vent plate.

Seal all wall cavities.
CONNECTING TO FURNACE

IMPORTANT: Clean and debur all pipe cuts. The shavings must not be allowed to block the exhaust, combustion air or condensate drain pipes.

UPFLOW FURNACE
The exhaust pipe connection is a 2-in. female PVC pipe fitting extending through the left side of the furnace top plate. This opening has a protective cap which should be removed just prior to installing the exhaust pipe. When 2-in. pipe is used, connect it directly to this fitting. When 3-in. pipe is used, connect a 2 to 3-in. coupling to this fitting with a short piece of 2-in. PVC pipe.

The combustion air connection is at the right side of the top plate. An alternate combustion air connection may be made on the right side of the jacket. This opening has a plastic cap. A combustion air connection fitting is supplied with the furnace and it must be installed in the furnace by screwing it into the opening. Make sure the rubber “O-ring” supplied with the furnace is used with this fitting. See Figure 28.

DOWNFLOW/HORIZONTAL FURNACE
The exhaust pipe connection is a 2-in. female PVC pipe fitting extending through the right side of the furnace top cover. This opening has a protective cap which should be removed just prior to installing the exhaust pipe. When 3-in. pipe is used, connect a 2 to 3-in. coupling to this fitting with a short piece of 2-in. PVC pipe.

The combustion air connection is a 2-in. extruded hole on the left side of the top plate. When a 2-in. pipe is used, attach a 2-in. PVC coupling over this hole with RTV sealant, drill two pilot holes, and add two sheet metal screws through the coupling into the extrusion to secure it in place before piping. When 3-in. pipe is used, connect a 2 to 3-in. coupling to this fitting with a short piece of 2-in. PVC pipe. See Figure 29.
**GENERAL INFORMATION**

**CAUTION**

DO NOT RUN DRAIN OUTDOORS. FREEZING OF CONDENSATE CAN CAUSE PROPERTY DAMAGE.

**IMPORTANT:** Do not connect into a common drain line with an air conditioner evaporator coil drain. A blocked or restricted drain line can result in overflow of the coil pan and negate the furnace blocked drain shutoff control.

**FILL TRAP ASSEMBLY WITH WATER BEFORE OPERATING THE FURNACE.** This can be done by removing the drain hose from the trap and pouring about a cup of water into the vent trap. Water will flow into the house drain when the trap is full.

If local codes require, install a condensate neutralizer cartridge in the drain line. Install cartridge in horizontal position only. Also install an overflow line if routing to a floor drain. See 29.

If no floor drain is available, install a condensate pump that is resistant to acidic water. Pumps are available from your local distributor. If pump used is not resistant to acidic water, a condensate neutralizer must be used ahead of the pump. The condensate pump must have an auxiliary safety switch to prevent operation of the furnace and resulting overflow of condensate in the event of pump failure. The safety switch must be wired through the “R” circuit only (low voltage) to provide operation in either heating or cooling modes.

**UPFLOW MODELS**

The condensate drain trap is located in the blower compartment on the left-hand side of the jacket. A short piece of 1/2-in. PVC pipe and a 1/2-in. tee are provided. Connect the 1/2-in. pipe to the elbow on the trap and the tee to this pipe so that the open end is upward. Run a drain tube from the bottom of the tee to a floor drain or condensate pump.

**IMPORTANT:** The upflow model only has a new drain system. There is a third port on the drain trap (marked by a red cap) for the hose attached to the induced draft motor. Remove plug in inducer drain hose and remove cap off drain trap before connecting inducer drain hose to drain trap. All three hoses MUST be attached during operation of the furnace. Be sure all three hoses are secured to the drain trap using the hose clamps provided in the parts bag.

**IMPORTANT:** If installing the unit over a finished ceiling or living area, be certain to install an auxiliary condensate drain pan under the entire unit extending out under the condensate tee.

**IMPORTANT:** There are two options when choosing a height for the condensate riser:

- **CONDENSATE OVERFLOW:** With a 5 inch riser installed above the tee, a blocked drain will result in overflow from the riser.
- **FURNACE SHUTDOWN:** To cause the furnace to shut down when a blocked drain is present, install a riser which is a minimum of 10 13/16”. If the furnace is installed in an attic, crawlspace or other area where freezing temperatures may occur, the furnace drain can freeze while shut off for long periods of time.

**FIGURE 30 UPFLOW CONDENSATE DRAIN**

Use a solvent cement that is compatible with PVC material. Cut the drain hoses to the appropriate length and connect to the trap with hose clamps. Tighten the clamps with pliers and check for leaks after attaching.

**IMPORTANT:** The inducer drain hose must slant downward away from inducer. If the hose is not slanted, the inducer will fill with water and cause the pressure switch to open, causing nuisance failures or intermittent operation.

**NOTE:** CONNECT INDUCER DRAIN HOSE TO SMALLER PORT ON CONDENSATE TRAP.
REVERSING THE TRAP

UPFLOW UNITS

The trap may be moved to the right side for right side drainage. Open the knockout for the drain on the right side of the cabinet. Remove the bracket holding the trap from the left side. Seal the left side drain hole with a plug provided in the cloth bag with the furnace. Position the mounting bracket and trap so that the drain elbow is centered in the hole on the right. See Figure 31.

Drill two 1/8" holes in the cabinet to mount the bracket. Mount the trap and bracket to the right side with the drain elbow pointing through the knockout. Connect the 1/2-in. pipe and tee as noted above. Route the drain hoses behind the control box, cut to the appropriate length, and connect to the trap with hose clamps. Fill trap with water.

IMPORTANT: Do not allow any sags or kinks in the hoses. This prevents proper condensate flow.

IMPORTANT: Do not connect into a common drain line with an air conditioner evaporator coil drain. A blocked or restricted drain line can result in overflow of the coil pan and negate the furnace blocked drain shutoff control.

DOWNFLOW MODELS

IMPORTANT: There are two options when choosing a height for the condensate riser:

CONDENSATE OVERFLOW: With a 1 3/4 inch riser installed above the tee, a blocked drain will result in overflow from the riser.

FURNACE SHUTDOWN: To cause the furnace to shut down when a blocked drain is present, install a riser which is a minimum of 5 1/2". If the furnace is installed in an attic, crawlspace or other area where freezing temperatures may occur, the furnace drain can freeze while shut off for long periods of time. Provisions must be made to prevent freezing of condensate.

Use a solvent cement that is compatible with PVC material.

To convert downflow models to left-hand drain, a kit (-)XGY-H01 must be ordered from the distributor. The kit includes a 24" piece of 1/2" black PVC pipe, a 2-9/16" length of black hose, a 2" rubber grommet, a 1-5/8" plug and instructions. Note the location of the alternate drain hole as shown in Figure 33.

To convert to left side drainage, remove the long black molded hose from the trap. Remove the double-elbow black molded hose from the trap and exhaust transition and discard. Remove the trap from its mounting bracket, rotate it 180 degrees and mount in place with the drainage elbow pointing to the left. Reattach the long black molded hose. Use the 2-9/16" length of black hose included in the (-)XGY-H01 kit between the trap and exhaust transition. Clamp hoses tight with white nylon clamps.

Remove the plug from the 2" alternate drain hole (see Figure 33) and replace it with the 2" rubber grommet supplied in the (-)XGY-H01 downflow alternate drain kit. Also, remove the 1-5/8" grommet supplied in the primary drain hole and replace it with the 1-5/8" diameter plug that is also supplied in the (-)XGY-H01 downflow alternate drain kit. Both the hole-plug and grommet must be in place to insure a good seal in the burner compartment.

A length of 1/2" black PVC pipe is also provided in the (-)XGY-H01 downflow alternate drain kit. Glue one end of the pipe to the elbow in the trap. Cut the pipe so that it extends through the alternate drain hole in the left side of the cabinet one inch. Connect the 1/2" PVC tee (supplied with the furnace) to the pipe with a 1-3/4" riser. Use the 1-5/8" plug supplied in the (-)XGY-H01 downflow alternate drain kit to seal the right side drainage hole.

IMPORTANT: Do not connect into a common drain line with an air conditioner evaporator coil drain located above the furnace. A blocked or restricted drain line can result in overflow of the coil pan and negate the furnace blocked-drain shutoff control.
CONDENSATE DRAIN FOR HORIZONTAL INSTALLATION

Refer to Figure 34 for Steps 1-4.

This unit is shipped factory ready for downflow installation. The condensate trap assembly and drain hoses require conversion for horizontal installation. Remove the existing condensate trap with the unit in the upright position.

1. Remove the burner compartment door from the unit.

2. Remove the two screws from the right side of the furnace jacket which support the trap mounting bracket. Remove the two plastic plugs on either side of the trap outlet hole and discard.

3. Remove the black molded 90° hose from the top of the existing trap and furnace collector box. Cut 1.0 inch from the long end of the hose. NOTE: Exception – do not shorten the 90° hose on the 07B furnace! The 07B has a longer distance between the collectorbox and horizontal drain trap.

4. Remove the double-elbow black molded hose from the exhaust transition. Discard this hose and the down flow trap.

NOTE: The following steps should take place with the furnace in the horizontal position.

Refer to Figure 35 for Steps 6-11.

5. Locate the parts bag in the burner compartment. Install two plastic plugs in the side of the jacket from bottom side up.

6. Fill the trap assembly with a cup of water.

7. Attach the gasket onto the trap assembly so that the gasket holes on the gasket line up with the holes on the trap assembly.

8. Insert the trap assembly with gasket up through the existing hole in the jacket and secure from inside the jacket. Use two screws provided. Screw down into the two “ears” molded into either side of the trap. Snug the trap assembly against the furnace jacket compressing the gasket slightly to eliminate any air leaks. Do not overtighten!

9. Attach the black molded rubber 90° elbow to the straight spout on the trap top using a white nylon clamp. Attach the other end of the rubber elbow to the spout located on the exhaust transition using a white nylon clamp.

10. Attach the 90° end of the molded hose to the collector box. Clamp the hose tight with white nylon clamp. Then attach the long end of the molded hose to the 45° elbow molded into the top of the trap assembly. Clamp the hose tight with white nylon clamp.

IMPORTANT: Tighten all clamp connections with a pair of pliers and check for leaks after conversion is complete.

11. IMPORTANT: There are two options when choosing a height for the condensate riser.

CONDENSATE OVERFLOW: With a 1 3/4 inch riser installed above the tee, a blocked drain will result in overflow from the riser.

FURNACE SHUTDOWN: To cause the furnace to shut down when a blocked drain is present, install a riser which is a minimum of 5 1/2". If the furnace is installed in an attic, crawlspace or other area where freezing temperatures may occur, the furnace drain can freeze while shut off for long periods of time. Provisions must be made to prevent freezing of condensate (see Figure 4).

Use a solvent cement that is compatible with PVC material.

NOTE: See location requirements and combustion section for additional recommendations.
CONDENSATE TRAP CONVERSION FROM DOWNFLOW TO HORIZONTAL INSTALLATION

FIGURE 34
UPRIGHT POSITION: REMOVAL OF EXISTING DOWNFLOW CONDENSATE TRAP

FIGURE 35
HORIZONTAL POSITION: CONDENSATE TRAP INSTALLATION FOR HORIZONTAL OPERATION
**GAS SUPPLY AND PIPING**

**GAS SUPPLY**

**WARNING**

THIS FURNACE IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT IS AVAILABLE AT THE DISTRIBUTOR. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. See the conversion kit index supplied with the furnace. This index identifies the proper LP Gas Conversion Kit required for each particular furnace.

IMPORTANT: Any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts.

IMPORTANT: Connect this furnace only to gas supplied by a commercial utility.

IMPORTANT: U.L. or CSA recognized fuel gas and CO detector(s) are recommended in all applications, and their installation should be in accordance with the manufacturer’s recommendations and/or local laws, rules, regulations or customs.

**GAS PIPING**

Install the gas piping according to all local codes and regulations of the utility company.

If possible, run a separate gas supply line directly from the meter to the furnace. Consult the local gas company for the location of the manual main shut-off valve. The gas line and manual gas stop must be adequate in size to prevent undue pressure drop and never smaller than the pipe size to the gas valve on the furnace. Refer to Table 5 for the recommended gas pipe size. See Figure 36 for typical gas pipe connections.

Install a ground joint union within 3 ft. of the cabinet to easily remove the gas valve assembly. Install a manual gas stop valve in the gas line outside the furnace casing. The manual gas stop should be readily accessible to turn the gas

---

**WARNING**

When gas line is in OPT. Position, swap location of grommet and plug.

**UPFLOW**

- **TOP VIEW OF GAS LINE AND VALVE**
- **IN OPT. POSITION**
- **MANUAL GAS STOP**
- **BURNERS**
- **GAS VALVE**
- **DRIP LEG**
- **UNION**
- **GROMMET**

**DOWNFLOW**

- **TOP VIEW OF GAS LINE AND VALVE**
- **IN OPT. POSITION**
- **MANUAL GAS STOP**
- **BURNERS**
- **IGNI TOR**
- **GAS VALVE**
- **DRIP LEG**
- **UNION**
- **GROMMET**

**HORIZONTAL**

- **MANUAL GAS STOP**
- **UNION**
- **DRIP LEG**
- **BURNERS**
- **MANIFOLD**
- **GAS VALVE**

**NOTE:** DO NOT RUN A FLEXIBLE GAS CONNECTOR INSIDE THE UNIT. Extend the 1/2" black pipe from the gas valve to the outside of the cabinet.
supply on or off. Install a drip leg in the gas supply line as close to the furnace as possible. Always use a pipe compound resistant to the action of liquefied petroleum gases on all threaded connections.

**IMPORTANT:** When making gas pipe connections, use a back-up wrench to prevent any twisting of the main gas valve and manifold. Do not overtighten gas valve on pipe.

Any strains on the gas valve can change the position of the gas orifices in the burners. This can cause erratic furnace operation.

**IMPORTANT:** Do not run a flexible gas connector inside the furnace. The gas pipe gasket in the cabinet does not seal around a flexible gas line.

If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance. Massachusetts law requires that all flexible connectors be less than 36".

It is important to have all openings in the cabinet burner compartment sealed for proper furnace operation.

**IMPORTANT:** ENSURE that the furnace gas valve not be subjected to high gas line supply pressures.

**DISCONNECT** the furnace and its individual manual gas stop from the gas supply piping during any pressure testing that exceeds 1/2 PSIG. (3.48 kPa).

**GAS PRESSURE**

*Natural gas supply pressure should be 5" to 10.5" w.c. LP gas supply pressure should be 11" to 13" w.c.*

This pressure must be maintained with all other gas-fired appliances in operation.

The minimum gas supply pressure to the gas valve for proper furnace input adjustments is 5" w.c. for natural gas, however 6" to 7" is recommended. The minimum gas supply pressure is 11" w.c. for LP gas.

**CAUTION**

**ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED “HIGH ALTITUDE INSTALLATIONS” OF THIS BOOK FOR INSTRUCTIONS.**

**TABLE 5**

**NATURAL GAS PIPE CAPACITY TABLE (CU. FT./HR.)**

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

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

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

\[
\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT3)}}
\]

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT³) may be determined by consulting the local natural gas utility or the LP gas supplier.

**FIGURE 37**

**TYPICAL GAS VALVE (WHITE RODGERS)**

**WARNING**

*NEVER PURGE A GAS LINE INTO THE COMBUSTION CHAMBER. NEVER USE MATCHES, FLAME OR ANY IGNITION SOURCE FOR CHECKING LEAKAGE. FAILURE TO ADHERE TO THIS WARNING CAN CAUSE A FIRE OR EXPLOSION RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.*

To check for gas leakage, use an approved chloride-free soap and water solution, or other approved method.

**GAS VALVE**

This furnace has a 24-volt gas valve. It has ports for measuring supply and manifold gas pressure. The valve body contains a pressure regulator to maintain proper manifold gas pressure.

A control switch is on the valve body. It can be set to only the “ON” or “OFF” positions. The gas valve is a slow-opening valve. See Figures 37 and 39.

When energized, it takes 6 to 8 seconds to fully open.
**LP CONVERSION**

The valve can be converted to use liquified petroleum (LP) gas by replacing the pressure regulator spring with the conversion kit spring. This LP kit spring allows the regulator to maintain the proper manifold pressure for LP gas. See Figure 38.

**NOTE:** Order the correct LP conversion kit from the furnace manufacturer. Refer to the latest “L.P. Conversion Kit Index” shipped with the furnace or see Rheemote.net and PTS for latest version. Furnace conversion to LP gas must be performed by a qualified installer, service agency or the gas supplier.

**ORIFICE INSTALLATION**

LP Gas is a manufactured gas that has consistent heating value across most regions.

The Sea Level input should still be reduced by 3.5-4% per thousand ft. and the orifice size must be selected based on the reduced input selection chart below.

**TO CHANGE BURNER ORIFICE**

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Orifice Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5000’</td>
<td>1.15 mm</td>
</tr>
<tr>
<td>5000’-8000’</td>
<td>1.10 mm</td>
</tr>
</tbody>
</table>

1. **WARNING**

**TURN OFF ELECTRICAL POWER AND MAIN GAS SUPPLY BEFORE BEGINNING MODIFICATION. FAILURE TO DO SO CAN RESULT IN ELECTRICAL SHOCK OR EXPLOSION CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

2. Disconnect union ahead of combination gas valve.
3. Disconnect leads from gas valve.
4. Remove the 4 screws holding the manifold assembly to the main burner assembly.
5. Replace the L.P. stem/spring assembly from kit as shown in Figures 39 and 40.
6. Remove each existing orifice from the manifold assembly using a ratchet with a 7/16 socket. Replace with orifices from the kit. Screw the orifices in hand tight and secure in place with a quarter turn with the ratchet.
7. Reinstall the manifold assembly on the burner assembly with the 4 screws removed in step 4.
8. Reconnect the leads to the gas valve, union, and electrical power to furnace.
9. Turn on the gas supply and check unit thoroughly for gas leaks using soap solution.
10. Follow lighting instructions to put furnace into operation.
11. Operate thermostat to check unit operation.

**WARNING**

**DO NOT USE AN OPEN FLAME.**

**NOTE:** If you have a single thermostat, the furnace will start on high fire then switches to low fire and will continue on low fire for 12 minutes and then if thermostat is not satisfied, shifts to high fire. With a 2-stage thermostat, when there is a call for low heat (1st stage), the furnace will start on high fire then switch to low fire until the call for heat is satisfied or 2nd stage contacts close.

**NOTE:** Order the correct LP conversion kit from the furnace manufacturer. Refer to the latest “L.P. Conversion Kit Index” shipped with the furnace or see Rheemote.net and PTS for latest version. Furnace conversion to LP gas must be performed by a qualified installer, service agency or the gas supplier.

**TO CONVERT GAS VALVE TO LP GAS AND CHECK/ADJUST GAS PRESSURE**

1. See Honeywell envelope kit #396021 for proper LP regulator spring and instructions. (See Figures 39 & 40.)
2. The LP gas supply pressure must be set between 11 and 13” W.C. by means of the tank or branch supply regulators.
3. The furnace manifold pressure should be 10” W.C. for high fire and 4.8” W.C. for low fire. These pressures can be checked by connecting a properly calibrated manometer or gauge to the manifold pressure tap on the outlet end of the valve. Check and adjust pressures as follows:
   
   a. For full input pressure remove adjustment screw cover on outlet end of valve and turn adjustment screw clockwise to increase pressure and counterclockwise to reduce pressure. Replace the adjustment cover screw securely.
   b. For low fire pressure, remove the regulator cover on top of valve and adjust as noted above.

   **NOTE:** Use 3/32” allen wrench for making pressure adjustments. See Figure 39.

**COMPLETING CONVERSION**

1. Using a ball point indelible pen, record the following information on the conversion label.
   a. Conversion kit number.
   b. Date of conversion.
   c. Installer’s name, address and telephone number.
   d. Burner orifice size.
2. Place completed conversion label adjacent to the rating plate.
3. Install the burner compartment access door.
4. Run furnace through complete cycle to check operation and temperature rise.

**FIGURE 39**
**GAS VALVE 60-24394-01 (HONEYWELL)**

**FIGURE 40**
**INLET PRESSURE TAP**
**HIGH FIRE MANIFOLD PRESSURE ADJUSTMENT**
**LOW FIRE MANIFOLD PRESSURE ADJUSTMENT**
**OUTLET PRESSURE TAP**
**GAS CONTROL TURN KNOB ON/OFF**

**PRESSURE REGULATOR COVER ASSEMBLY**
**STEM/SPRING ASSEMBLY (BLACK—LP GAS, WHITE—NATURAL GAS)**
accessible and located within site and arm’s reach of the furnace. Connect from the electrical disconnect to the junction box on the left side of the furnace, inside the blower compartment. For the proper connection, refer to the appropriate wiring diagram located on the inside cover of the furnace control box and in these instructions.

**NOTE:** UPFLOW MODELS ONLY
The electrical junction box may be moved to the right side if necessary. A knockout is provided. Seal the opposite hole with plug provided.

**NOTE:** L1 (hot) and N (neutral) polarity must be observed when making field connections to the furnace. The ignition control may not sense flame if L1 and Neutral are reversed. When L1 and Neutral are reversed, a diagnostic code of 6 blinks followed by a pause and 6 blinks will be displayed on the control board “Status” L.E.D. See Figure 41.

Make all electrical connections in accordance with the latest edition of the National Electrical Code ANSI/NFPA70 and local codes having jurisdiction.

These may be obtained from:
- National Electric Code
- National Fire Protection Association, Inc.
  Batterymarch Park
  Quincy, MA 02269
- CSA Standards
  CSA - International
  178 Rexdale Blvd.
  Etobicoke (Toronto), Ontario
  Canada M9W, 1R3

**FIGURE 41**
LINE VOLTAGE CONNECTIONS

UT ELECTRONIC CONTROLS 1095-206 CONTROL BOARD
THERMOSTAT
NOTE: Do not use 24 volt control wiring smaller than No. 18 AWG. (Refer to Table 6.)
See Figure 42 for thermostat wiring options.
A single- or two-stage thermostat may be used, however, a two-stage thermostat is recommended for optimum performance.
The room thermostat must be compatible with the integrated furnace control on the furnace. Generally, all thermostats that are not of the “current robbing” type are compatible with the integrated furnace control being used.
Install the room thermostat in accordance with the instruction sheet in the box with the thermostat. Run the thermostat lead wires inside the control compartment.
Connect the thermostat as shown on the wiring diagram. Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes, lighting fixtures, radiation from fireplace, rays of sun, lamps, television, radios or air streams from registers. Refer to the instructions packed with the thermostat for best anticipator adjustment or selection.
Locate the thermostat approximately five feet up from the floor.
HEAT ANTICIPATOR SETTINGS
If a current reading taken at the thermostat is not performed, an initial setting of .15 amps is recommended. Adjust as needed to improve comfort level.

ISOLATION RELAY
IMPORTANT: NOT ALL ELECTRONIC NIGHT SETBACK THERMOSTATS ARE COMPATIBLE WITH THE FURNACE CONTROL SYSTEM. SOME MAY REQUIRE AN ISOLATION RELAY.
If an isolation relay is needed, install it as close to the control board as possible. Use a single-pole, single-throw relay with a 24 volt operating coil. The relay contacts should be designed for 24 volt loads.
Connect one end of the operating coil to the thermostat “W” terminal.
Connect the other end of the coil to the control board “C” terminal on the control board.
➢ Connect a jumper from the coil terminal connected to the thermostat to one of the normally open relay contacts.
➢ Connect the other side of the normally open relay contacts to the control board “W” terminal if using a two stage thermostat. Connect that one side of the normally open relay contacts to the control board “W” terminal if using a single stage thermostat. See Figure 42 for wiring details.

FIELD-INSTALLED OPTIONAL ACCESSORIES
When the thermostat calls for heat, it powers the 24 volt operating coil. This closes the relay contacts and conducts power from terminal 3 and 4 to terminal “W” on the control board and starts the furnace ignition sequence. See Figure 43.
➢ NOTE: Use of an isolation relay with the two stage furnace is not normally needed.

ELECTRONIC AIR CLEANER
Electronic air cleaner line voltage power can be supplied from the screw terminal “EAC” and a line voltage neutral screw terminal on the control board. This will power the electronic air cleaner whenever the circulating air blower is in operation.

HUMIDIFIER
Line voltage power can be supplied from screw terminal “HUM” to a line voltage neutral screw terminal on the control board. This will power the humidifier during a normal heat sequence after the blower has turned on.
NOTE: Maximum current of 1.0 Amp for each option.
90+ HIGH ALTITUDE INSTRUCTIONS

NATURAL GAS
The RGRM and RGTM models do not require any changes for high altitude application in the U.S.

LP GAS AT HIGH ALTITUDE ELEVATIONS
LP Gas is a manufactured gas that has consistent heating value across most regions.

The NFHC guidelines are used with the following exception:

See the "L.P. Conversion" Section on page 39 for U.S. application.

ORIFICE ORDERING INFORMATION

IMPORTANT: Do not plug or drill out orifices.

Orifice sizes are selected by adding the 2-digit drill size required in the orifice part number. Drill sizes available are 39 through 64; metric sizes available 1.10mm (-90) and 1.15mm (-91):

<table>
<thead>
<tr>
<th>THERMOSTAT LOAD - AMPS</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>#50</td>
<td>16</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>#51</td>
<td>18</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>LENGTH OF RUN - FEET ①</td>
<td>50</td>
<td>100</td>
<td>150</td>
</tr>
</tbody>
</table>

① Wire length equals twice the run distance

NOTE: Do not use 24 volt control wiring smaller than No. 18.

ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE
In Canada, unless an orifice change is specifically mandated by local codes, an alternate method of altitude deration through a reduction in manifold pressure is acceptable as described in Table 7.

The information in Table 7 is based on a heating value of 1000 BTU per cubic feet of natural gas, and 2500 BTU per cubic feet of LP gas.

IMPORTANT: Actual input rates must be measured on-site with manifold pressure adjustment to ensure that an actual 10% reduction in input rate is achieved.

Once this field adjustment has been made, the label shown in Figure 44 must be affixed in a conspicuous location on the front of the furnace cabinet:

NOTE: This label is supplied in the information packet shipped with each furnace.

TABLE 7
ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE
IMPORTANT: 90+ MODELS ONLY. DO NOT USE THIS CHART FOR ANY 80 PLUS MODELS.

<table>
<thead>
<tr>
<th>ALTITUDE</th>
<th>INPUT</th>
<th>OUTPUT</th>
<th>ORIFICE SIZE</th>
<th>MANIFOLD PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL GAS</td>
<td>45,000</td>
<td>40,500</td>
<td>#50</td>
<td>3.5&quot; W.C.</td>
</tr>
<tr>
<td>0' - 2000'</td>
<td>54,000</td>
<td>49,500</td>
<td>3.0&quot; W.C.</td>
<td></td>
</tr>
<tr>
<td>2001' - 4500'</td>
<td>59,000</td>
<td>53,500</td>
<td>3.0&quot; W.C.</td>
<td></td>
</tr>
<tr>
<td>LP GAS</td>
<td>45,000</td>
<td>40,500</td>
<td>#51</td>
<td>1.15mm 10&quot; W.C.</td>
</tr>
<tr>
<td>0' - 2000'</td>
<td>54,000</td>
<td>49,500</td>
<td>1.15mm 10&quot; W.C.</td>
<td></td>
</tr>
<tr>
<td>2001' - 4500'</td>
<td>59,000</td>
<td>53,500</td>
<td>1.15mm 7.5&quot; W.C.</td>
<td></td>
</tr>
</tbody>
</table>

FIGURE 44
MANIFOLD PRESSURE-CHANGE LABEL
THE MANIFOLD PRESSURE OF THIS APPLIANCE HAS BEEN FIELD ADJUSTED TO OBTAIN THE CORRECT INPUT RATING FOR INSTALLATION AT ALTITUDES BETWEEN 2,000 FEET AND 4,500 FEET ELEVATION.

ST-A0804-01

FIGURE 43
BASIC ISOLATION RELAY – SEE FIGURE 42 FOR DETAILS

TABLE 6
FIELD WIRE SIZE FOR 24 VOLT CONTROL CIRCUITS

<table>
<thead>
<tr>
<th>SOLID COPPER WIRE - AWG</th>
<th>3.0</th>
<th>2.5</th>
<th>2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>14</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>16</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>18</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>LENGTH OF RUN - FEET ①</td>
<td>50</td>
<td>100</td>
<td>150</td>
</tr>
</tbody>
</table>

① Wire length equals twice the run distance

NOTE: Do not use 24 volt control wiring smaller than No. 18.
START-UP PROCEDURES

DIRECT SPARK IGNITION
LIGHTING INSTRUCTIONS

This appliance is equipped with a direct spark ignition device. This device lights the main burners each time the room thermostat (closes) calls for heat. See lighting instructions on the furnace.

During initial start-up, it is not unusual for odor or smoke to come out of any room registers. It is recommended to ensure proper ventilation by opening windows and doors, before initial firing.

The furnace has a negative pressure switch that is a safety during a call for heat. The induced draft blower must pull a negative pressure on the heat exchange to close the negative pressure switch. The induced draft blower must maintain at least the negative pressure switch set point for the furnace to operate. If the induced draft blower fails to close or maintain the closing of the negative pressure switch, a heat call would be prevented until the problem is cleared.

TO START FURNACE

1. Remove the control access door.

2. BE SURE THAT THE MANUAL GAS CONTROL HAS BEEN IN THE “OFF” POSITION FOR AT LEAST FIVE MINUTES. DO NOT ATTEMPT TO MANUALLY LIGHT THE MAIN BURNERS. FAILURE TO FOLLOW THIS WARNING CAN CAUSE A FIRE OR AN EXPLOSION RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

3. Turn off the furnace electrical power and set the room thermostat to the lowest setting.

4. Turn the gas control knob to the “On” position, or move the gas control lever to the “On” position.

5. Replace the control access door.

6. Turn on the electrical power.

7. Set the room thermostat to a point above room temperature to light the main burners. After the burners are lit, set room thermostat to a desired temperature.

TO SHUT DOWN FURNACE

1. Set the room thermostat to off and its lowest setting.

2. Turn manual gas stop to the closed position.

3. Turn off the electrical power to the furnace.

4. Remove burner compartment door.

5. Move the main gas valve knob or lever to the off position.

6. Replace the burner compartment door.

**WARNING**

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, SHUT OFF THE MANUAL GAS VALVE TO THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

IGNITOR PLACEMENT, ALIGNMENT & LOCATION

Ignition failure may be a result of improper ignitor alignment caused during a service call or other work done to the furnace in the field. When performing any work on the burner, heat exchanger, etc., the technician must check alignment of the spark ignitor. Misalignment of the ignitor could cause a failure to light or rough ignition. The correct ignitor alignment is shown in Figure 45.

SEQUENCE OF OPERATION

See the section of this book titled “Electrical Wiring - Thermostat” for a wiring diagram showing how to connect a thermostat.

---

**FIGURE 45**

UPFLOW OPTIMUM IGNITOR LOCATION

DOWNFLOW/HORIZONTAL OPTIMUM IGNITOR LOCATION
goes through another ignition sequence. It does this up to 4 times.
e. The inducer and gas valve immediately drop to low fire, the main blower starts on low heat speed 20 seconds after the flame is sensed. The furnace operates on low fire for 5 or 12 minutes and then, if the thermostat is not satisfied, shifts to high fire, causing the draft inducer to go to high speed, the gas valve to shift to 100% and the main blower to high heat speed. (In some models low and high fire have identical main blower airflow CFM.)
f. When the thermostat cycle ends, the gas valve closes, and the burners go out.
g. The draft inducer will continue running for a 10 second post purge.
h. The main blower runs for 80-180 seconds on high heat speed or 90-180 seconds on low heat speed (this timing is field adjustable). See Figure 48 for switch settings.

**Sequence if the system doesn’t light or doesn’t sense flame**

a. If flame is not sensed within 8 seconds after the gas valve opens, the valve closes and the ignitor is de-energized. The induced draft motor will run for 60 seconds on high, and then begins another heat cycle.
b. The ignition process goes through 3 more attempts.
c. If there is no ignition after the 4th trial, the furnace goes into soft lockout for one hour.
d. The sequence repeats after a one hour delay and continues repeating until ignition is successful or the call for heat is terminated.
e. To reset the lockout, break power either at the thermostat or at the unit disconnect switch for 5 to 10 seconds. The furnace then goes through another set of trials for ignition (provided call for heat is still present).
f. If flame is established and maintained during the trial for ignition period and flame is lost, the gas valve is de-energized, the draft inducer completes the post purge, and control shuts off the inducer, senses the open pressure switch and begins the ignition sequence again from pre-purge. The indoor blower motor will be energized and/or remain energized on low speed for low fire and heat speed for high fire for the selected delay off time.

The control initiates another ignition trial period. The control will recycle up to 5 flame losses (4 re-cycles) within a single call for heat before going into lockout.

**TWO STAGE HEAT THERMOSTAT**

Connect “W1” and “W2” terminals on the thermostat to “W” and “W2” terminals on the control board.

See the section of this book titled “Electrical Wiring - Thermostat” for a wiring diagram showing how to connect a thermostat.

**NOTE:** When there is a low heat call present at the time of ignition, this furnace will light on high fire heat and immediately drop to low fire as soon as flame is sensed. This can sometimes appear to be ignition on low heat stage but this is not the case. Listen carefully to hear the inducer and gas valve relays switch to low fire after ignition when a low heat call is present. If a high heat call is present at the time of ignition and steady state heat will occur at high fire and there will be no change in operation after ignition.

**Call for 1st stage heat**

a. The “R” and “W” thermostat contacts close and the control module runs a self-check routine. After the control module verifies that both sets of pressure switch contacts are open, the induced draft motor starts on high until the low pressure switch contacts close (a maximum of 60 seconds).
b. After a 30 second pre-purge the spark igniter energizes and the high fire gas valve opens, lighting the burners.
c. After the burners light, the remote flame sensor must prove ignition. If the burners do not light, the system goes through another ignition sequence. It does this up to 4 times.
d. The furnace immediately drops inducer and gas valve to low fire after sensing flame. The main blower starts on low heat speed 20 seconds after the flame is proven. The furnace continues to run on low fire until the call for heat is satisfied or the 2nd stage contacts close. If the 1st stage call for heat is satisfied the gas valve closes and the induced draft motor continues running for a 10 second post purge time, the main blower runs for its blow off delay (this timing is field adjustable). See Figure 46 for switch settings.

**Call for 2nd stage heat after 1st stage**

The “R” and “W2” thermostat contacts close, calling for 2 stage heat. The induced draft motor switches to high speed and the high pressure switch contacts close. The gas valve switches to high fire and the main blower switches to high heat speed.

**2nd stage heat satisfied, 1st stage heat still required**

The “R” and “W2” thermostat contacts open. The induced draft motor switches to low speed, the main blower motor switches to low heat speed and the gas valve changes to low fire. The furnace continues to run in this mode until the 1st stage heat call is satisfied. The system will shut down as noted in “d,” under 1st stage call for heat.

**NOTE:** Under extreme cold conditions, the 2-stage thermostat may call for the furnace to cycle between 1st and 2nd stage operation.

**INTEGRATED FURNACE CONTROL & ECM MOTOR SETTINGS**

These furnaces have ECM blower motors. These motors deliver a constant level of air flow over a wide range of external static pressures (0.1 to 0.8” W.C.).

There is a bank of 12 dip switches (SW1) on the control board which define the operation of the ECM motor. (See Table 8) (See Figure 48.) Many of these switches (except for switches 9 and 12) are actually broken down into dip switch pairs. The following switches are paired 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 11*.

---

**TABLE 8**

<table>
<thead>
<tr>
<th>SWITCHES</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>Heat Rise Adjustment</td>
</tr>
<tr>
<td>3 &amp; 4</td>
<td>Not Used</td>
</tr>
<tr>
<td>5 &amp; 6</td>
<td>Nominal Cooling/Heat Pump Air Flow</td>
</tr>
<tr>
<td>7 &amp; 8+</td>
<td>Latent/Sensible Airflow Adjustment</td>
</tr>
<tr>
<td>9</td>
<td>Continuous Fan Airflow</td>
</tr>
<tr>
<td>10 &amp; 11*</td>
<td>On Demand Dehumidification Settings</td>
</tr>
<tr>
<td>12</td>
<td>1 or 2 Stage Cool</td>
</tr>
</tbody>
</table>

---

**FIGURE 46**

- [Image of a diagram showing electrical connections and settings]
With this feature, dehumidists will work with this feature.

*IMPORTANT:

- Table 8 and Figure 47.
- Assignments of switch pairs are shown in Table 8 and Figure 47.

**HEATING AIRFLOW ADJUSTMENTS**

The furnace is shipped with low and high fire heating airflow. These are set from the factory to let the furnace operate at the mid point of the temperature rise range. The temperature may vary slightly due to furnace input manufacturing tolerances and voltage variations.

In the heating mode, the ECM motor is programmed to ramp up to its target CFM over a fifteen (15) second period. After any of the user selected “OFF” delays the ECM motor will ramp down to 50% of steady state CFM for approximately thirty (30) seconds. The motor will then ramp down to off.

**COOLING AIRFLOW ADJUSTMENTS**

The furnace motor is programmed to provide cooling airflow of 1%, 2%, and 3 tons in the RGRM-04*MAES, RGRM-06*MAES and RGRM-07*MAES and of 2%, 3%, and 4 tons are available in the RGRM-07*YBGS units. Airflows of 3, 4, and 5 tons are available in the RGRM-09EAJS, RGRM-10EAJS, RGRM-12ERAJS units. See Table 13 for airflow options.

Furnaces are shipped from the factory set for maximum cooling airflow. Adjustments to the cooling airflow may be made using switches 7 and 8 as shown in Table 9.

**TWO-STAGE COOLING SELECTION**

Dipswitch SW1, Position #12 on the Integrated Furnace Control (IFC) ships from the factory in the “ON” position. This dipswitch is to be used to designate single or two-stage cooling to the IFC. The “ON” (as now shipped) position designates a single-stage air conditioning system or heating-only application. The “OFF” position designates a two-stage air conditioning system or a single-stage cooling system where the cooling airflow used is the 1st stage cooling input as described in the section of this document titled Additional Cooling Speeds for Single Stage Cooling Applications. Turn the switch to the “OFF” position when using two-stage cooling with separate contactors, Y1 and Y2.

**TWO-STAGE COOLING SELECTION**

Dipswitch SW1, Position #12 on the Integrated Furnace Control (IFC) ships from the factory in the “ON” position. This dipswitch is to be used to designate single or two-stage cooling to the IFC. The “ON” (as now shipped) position designates a single-stage air conditioning system or heating-only application. The “OFF” position designates a two-stage air conditioning system or a single-stage cooling system where the cooling airflow used is the 1st stage cooling input as described in the section of this document titled Additional Cooling.
**ADDITONAL COOLING SPEEDS FOR SINGLE-STAGE COOLING APPLICATIONS**

In addition to the listed cooling airflow for single-stage cooling, the installer has the option of using the first-stage cooling airflow of the furnace for full cooling airflow speed. This is done by simply connecting a single-stage thermostat's “Y” terminal to the furnace control's “Y1” terminal. The terminal “Y2” of the furnace control is left disconnected. In this case, the airflow delivered by the furnace for full cooling would be the same as the airflow for first-stage cooling of a two-stage cooling system. This gives the user more options for cooling airflow. Table 12 indicates the approximate cooling airflow for both first and second stage.

**NOTE:** The dipswitch SW1-12 must be set to the “OFF” position for this particular configuration in order to utilize the first-stage cooling input which is inoperative when the dipswitch is “ON”. The furnace control is shipped from the factory with this switch in the “ON” position so it will need to be turned “OFF” in order to utilize this feature.

**CONTINUOUS FAN ADJUSTMENTS**

There are two options for the adjustment of continuous fan. With switch 9 “ON” the speed will be high fan. With switch 9 “OFF” the speed will be low fan.

<table>
<thead>
<tr>
<th>CONTINUOUS FAN AIRFLOW (CFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT BTU</td>
</tr>
<tr>
<td>45 &amp; 50</td>
</tr>
<tr>
<td>75k (1/2)</td>
</tr>
<tr>
<td>75k (3/4)</td>
</tr>
<tr>
<td>105k</td>
</tr>
<tr>
<td>120k</td>
</tr>
</tbody>
</table>

**TABLE 11**

**HEAT RISE ADJUSTMENTS**

<table>
<thead>
<tr>
<th>Profile</th>
<th>SW1-1 &amp; SW1-2</th>
<th>Temperature Rise (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>OFF/OFF</td>
<td>Nominal Setting - See Table 13</td>
</tr>
<tr>
<td>B</td>
<td>ON/OFF</td>
<td>Nominal +15°F</td>
</tr>
<tr>
<td>C</td>
<td>OFF/ON</td>
<td>Nominal +8°F</td>
</tr>
<tr>
<td>D</td>
<td>ON/ON</td>
<td>Nominal -8°F</td>
</tr>
</tbody>
</table>

**TABLE 12**

**TEMPERATURE RISE BY MODEL**

<table>
<thead>
<tr>
<th>Model</th>
<th>Speed</th>
<th>Nominal Temperature Rise (°F)</th>
<th>Nominal Temperature Rise (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGRM-04*MAES</td>
<td>LOW HEAT</td>
<td>30</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>45</td>
<td>25.0</td>
</tr>
<tr>
<td>RGRM-06*MAES</td>
<td>LOW HEAT</td>
<td>50</td>
<td>27.8</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>55</td>
<td>30.6</td>
</tr>
<tr>
<td>RGRM-07*MAES</td>
<td>LOW HEAT</td>
<td>50</td>
<td>27.8</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>55</td>
<td>30.6</td>
</tr>
<tr>
<td>RGRM-07*YBGS</td>
<td>LOW HEAT</td>
<td>35</td>
<td>19.4</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>50</td>
<td>27.8</td>
</tr>
<tr>
<td>RGRM-09*ZAJS</td>
<td>LOW HEAT</td>
<td>40</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>50</td>
<td>27.8</td>
</tr>
<tr>
<td>RGRM-10*ZAJS</td>
<td>LOW HEAT</td>
<td>45</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>55</td>
<td>30.6</td>
</tr>
<tr>
<td>RGRM-12*RAJS</td>
<td>LOW HEAT</td>
<td>55</td>
<td>30.6</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>65</td>
<td>36.1</td>
</tr>
<tr>
<td>RGTM-06*MAES</td>
<td>LOW HEAT</td>
<td>40</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>45</td>
<td>25.0</td>
</tr>
<tr>
<td>RGTM-07*RBGS</td>
<td>LOW HEAT</td>
<td>40</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>45</td>
<td>25.0</td>
</tr>
<tr>
<td>RGTM-09*ZAJS</td>
<td>LOW HEAT</td>
<td>40</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>45</td>
<td>25.0</td>
</tr>
<tr>
<td>RGTM-10*RBJS</td>
<td>LOW HEAT</td>
<td>45</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>HIGH HEAT</td>
<td>50</td>
<td>27.8</td>
</tr>
</tbody>
</table>

**NOTE:** Temperature Rise could be adjusted by changing dip switches as shown in Table 9.
Furnace control. On Demand and Dehumidification throughout the heat mode. This will prevent adverse humidity and heat rise effects of using these adjustments during a heat pump's heat mode. The "B" terminal does not apply to gas operation.

Dehumidification

The interface control has two optional 24 volt AC only inputs. The "B" terminal input is provided for heat pump applications. This signal comes from a heat pump thermostat and tells the heat pump to switch its reversing valve to heat mode. If this "B" signal is also routed to the furnace control, all airflow adjustments (7 & 6 of SW1) and "On Demand Dehumidification" are bypassed in the heat mode only. The airflow will remain at the normal airflow as selected by switches 5 & 6 throughout the heat mode. This allows the user to have a switched (reduced) airflow adjustment for dehumidification or the "On Demand Dehumidification" in cooling mode, but not the reverse. The "B" terminal does not apply to gas operation. The "On Demand Dehumidification" (ODD) input allows the user to have automatic dehumidification that is controlled by the user's humidistat setting. Dehumidistats are not compatible with the furnace control. On Demand Dehumidification (ODD) when not using a humidistat, or thermostat with a dehumidification feature. Switch selection lowers airflow CFM continuously by about 17% by turning "off" the input to the ODD terminal. SWITCHES SHOULD BE LEFT AT THE FACTORY DEFAULT SETTINGS TO PREVENT LOWER THAN EXPECTED AIRFLOW.

(ODD) ON-DEMAND-DEHUMIDIFICATION WITH HUMIDISTAT, OR THERMOSTAT, WITH DEHUMIDIFICATION FEATURE.

Normal airflow is reduced by a pre-programmed amount to maximize latent moisture removal. Zero voltage will be supplied to the ODD terminal, under high humidity, and the CFM will be dropped approximately 17%. When humidity is low, 24 Volts will be supplied to the ODD terminal, with CFM based on settings made to terminal pairs for cooling airflow and airflow adjustments. Be sure to use a humidistat with these settings or airflow will be reduced. When no voltage is present on ODD and the ODD feature is enabled (see Table 15), cooling airflow is decreased 15%. This results in higher latent capacity and increases the level of comfort. This feature is only available in the cooling mode.

Adjusting or Checking Furnace Input

A properly calibrated manometer or gauge is required for accurate gas pressure readings.

Table 13

<table>
<thead>
<tr>
<th>Profile</th>
<th>SW1-5 &amp; SW1-6</th>
<th>SW1-5 &amp; SW1-6</th>
<th>SW1-5 &amp; SW1-6</th>
<th>SW1-5 &amp; SW1-6</th>
<th>SW1-5 &amp; SW1-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>OFF/OFF</td>
<td>1200 CFM Hi / 900 CFM Low</td>
<td>1600 CFM Hi / 1200 CFM Low</td>
<td>2000 CFM Hi / 1500 CFM Low</td>
<td>2400 CFM Hi / 1800 CFM Low</td>
</tr>
<tr>
<td>B</td>
<td>ON/OFF</td>
<td>1000 CFM Hi / 750 CFM Low</td>
<td>1400 CFM Hi / 1050 CFM Low</td>
<td>1600 CFM Hi / 1200 CFM Low</td>
<td>2000 CFM Hi / 1500 CFM Low</td>
</tr>
<tr>
<td>C</td>
<td>OFF/ON</td>
<td>800 CFM Hi / 600 CFM Low</td>
<td>1200 CFM Hi / 900 CFM Low</td>
<td>2400 CFM Hi / 1800 CFM Low</td>
<td>3600 CFM Hi / 2700 CFM Low</td>
</tr>
<tr>
<td>D</td>
<td>ON/ON</td>
<td>600 CFM Hi / 450 CFM Low</td>
<td>800 CFM Hi / 600 CFM Low</td>
<td>1000 CFM Hi / 750 CFM Low</td>
<td>1200 CFM Hi / 900 CFM Low</td>
</tr>
</tbody>
</table>

Table 14

<table>
<thead>
<tr>
<th>Profile</th>
<th>SW1-5 &amp; SW1-6</th>
<th>SW1-5 &amp; SW1-6</th>
<th>SW1-5 &amp; SW1-6</th>
<th>SW1-5 &amp; SW1-6</th>
<th>SW1-5 &amp; SW1-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>OFF/OFF</td>
<td>1200 CFM Hi / 900 CFM Low</td>
<td>1600 CFM Hi / 1200 CFM Low</td>
<td>2000 CFM Hi / 1500 CFM Low</td>
<td>2400 CFM Hi / 1800 CFM Low</td>
</tr>
<tr>
<td>B</td>
<td>ON/OFF</td>
<td>1000 CFM Hi / 750 CFM Low</td>
<td>1400 CFM Hi / 1050 CFM Low</td>
<td>1600 CFM Hi / 1200 CFM Low</td>
<td>2000 CFM Hi / 1500 CFM Low</td>
</tr>
<tr>
<td>C</td>
<td>OFF/ON</td>
<td>800 CFM Hi / 600 CFM Low</td>
<td>1200 CFM Hi / 900 CFM Low</td>
<td>2400 CFM Hi / 1800 CFM Low</td>
<td>3600 CFM Hi / 2700 CFM Low</td>
</tr>
<tr>
<td>D</td>
<td>ON/ON</td>
<td>600 CFM Hi / 450 CFM Low</td>
<td>800 CFM Hi / 600 CFM Low</td>
<td>1000 CFM Hi / 750 CFM Low</td>
<td>1200 CFM Hi / 900 CFM Low</td>
</tr>
</tbody>
</table>

Table 15

<table>
<thead>
<tr>
<th>Switch Selection</th>
<th>Air Flow Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>15% Less cooling Airflow</td>
</tr>
<tr>
<td>B</td>
<td>Normal Cooling Airflow for Table 13</td>
</tr>
<tr>
<td>C</td>
<td>On Demand Dehumidification (Humidistat controls cooling airflow)</td>
</tr>
<tr>
<td>D</td>
<td>Normal Cooling Airflow</td>
</tr>
</tbody>
</table>

Natural Gas

1. When adjusting the furnace input, the high fire input should be checked. The high fire manifold pressure should be 3.5 W.C. Follow these steps to be sure the furnace is high fire mode:
   a. With a single stage thermostat, the furnace runs for 12 minutes on low fire before shifting to high fire. To be certain that it is on high fire, connect terminals "R", "W" and "W2" together on the control board in the blower compartment.
   b. With a two stage thermostat, set the thermostat to its highest setting to keep the furnace operating in the high fire mode.

2. To adjust high fire manifold pressure, remove the adjustment cover screw on the outlet end of the gas valve and turn the adjustment screw clockwise to increase the pressure and counterclockwise to reduce the pressure. Replace the cover screw securely. See Figure 27.

3. The low fire manifold pressure should be 1.7 W.C. As mentioned above, the furnace remains in the low fire mode for 12 minutes upon a heat call with a single stage thermostat. With a two stage thermostat, disconnect the thermostat lead to the "W2" terminal on the IFC and the furnace will remain in the low fire mode. To adjust the pressure, remove the regulator cover, on top of the valve, and adjust as noted under Step 2, above. After the adjustment replace the screw cover securely.
**AIR FLOW**

The importance of proper airflow over the heat exchanger cannot be over emphasized.

▶ CAUTION

**IT IS IMPORTANT THAT EACH DUCT SYSTEM BE SIZED AND INSTALLED FOR THE SPECIFIC APPLICATION BY PROPERLY APPLYING THE APPROPRIATE INDUSTRY ACCEPTED STANDARD. IF LESS THAN MINIMUM STANDARDS ARE APPLIED, THE EQUIPMENT USER COULD EXPECT TO EXPERIENCE HIGHER UTILITY BILLS, MAJOR COMPONENT FAILURE, VARYING DEGREES OF AIR NOISE OR OTHER UNSATISFACTORY ISSUES, OVER WHICH THE EQUIPMENT MANUFACTURER HAS NO CONTROL.**

**TEMPERATURE RISE CHECK**

To determine if the airflow is correct, make a temperature rise check.

1. Insert a thermometer in the supply air duct as close to the furnace as possible yet out of a direct line from the heat exchanger. See Figure 49.
2. Insert a thermometer in the return air duct as close to the furnace as possible.
3. Operate the furnace. High fire and low fire heating modes have the same temperature rise range.
4. When the thermometer in the supply air duct stops rising (approximately five minutes), subtract the return air temperature from the supply air temperature. The difference is the temperature rise.
5. Compare the measured temperature rise to the approved temperature rise range listed on the furnace name plate. See Figure 50.

If the measured temperature rise is above the approved range, the air flow is too low. More air must be moved by speeding up the blower, by removing restrictions in the duct system, or by adding more supply or return air duct. If the measured temperature rise is below the approved range, the air flow is too much. Use lower speed tap on the multi-speed blower.

▶ WARNING


**FIGURE 49**

**TEMPERATURE RISE MEASUREMENT**

**FIGURE 50**

**TYPICAL FURNACE NAME PLATE**

---

*WARNING*

*CAUTION*
MAINTENANCE

WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

FIGURE 51  FILTER LOCATIONS

TABLE 14  FILTER SIZES

<table>
<thead>
<tr>
<th>UPFLOW FILTER SIZES</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FURNACE WIDTH MBTUH</td>
<td>BOTTOM SIZE</td>
<td>SIDE SIZE</td>
<td>QUANTITY</td>
<td></td>
</tr>
<tr>
<td>17&quot;5/8&quot; 45, 60, 75A</td>
<td>15/4&quot; X 25&quot;</td>
<td>15/4&quot; X 25&quot;</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21&quot; 75B, 90, 105</td>
<td>19/4&quot; X 25&quot;</td>
<td>15/4&quot; X 25&quot;</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>24&quot;5/8&quot; 120</td>
<td>22/4&quot; X 25&quot;</td>
<td>15/4&quot; X 25&quot;</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DOWNFLOW/HORIZONTAL FILTER SIZES</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FURNACE WIDTH MBTUH</td>
<td>SIZE</td>
<td>QUANTITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17&quot;5/8&quot; 60, 75A</td>
<td>12&quot; X 20&quot;</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21&quot; 75B, 90, 105</td>
<td>12&quot; X 20&quot;</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24&quot;5/8&quot; 120</td>
<td>14&quot; X 20&quot;</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.
**Figure 52 Bottom Panel Removal**

**Filter Location**
- **Jacket Assembly**
- **Solid Bottom**
- **Remove Solid Bottom**
- **Screw (2) Req'd.**

**Solid Bottom Removal**
- **Filter & Rod Location**

**Note:**
- Back flange of solid bottom fits underneath jacket. Sides and front flanges fit over flanges on jacket.

---

**Figure 52 Upflow Bottom Return**

**Airflow**
- **Jacket Assembly**
- **Solid Bottom**

**Note:**
- Use both side returns for 1800 CFM or more.

---

**Figure 52 Upflow Side Return**

**Airflow**
- **CUT-OUT AND DRILL DETAIL**
- **Cut-out using embossed angles as a guide for proper size.**
- **Drill (2) 3/16" Dia. Holes**

---

**Angle Detail**
- **Angle**
- **Jacket**
- **Solid Bottom**
- **Filter Rod Support Angle AE-60520-01**
- **Filter Support Angle (See Angle Detail) AE-61883-01**

---

**Filter and Rod Assembly**
- **Filter Rod 45-24095-01**
- **Filter Support Angle AE-60520-01**
- **Filter Support Angle AE-61883-01**
- **Screw (2) Req'd.**
WARNING
DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

FILTER MAINTENANCE
Have your qualified installer, service agency or the gas supplier instruct you on how to access your filters for regular maintenance.

FILTERS
Filter application and placement are critical to airflow, which may affect the heating and cooling system performance. Reduced airflow can shorten the life of the system’s major components, such as motor, limits, heat exchanger, evaporator coil or compressor. Consequently, we recommend that the return air duct system have only one filter location. The most common location will be inside the furnace or a filter box. For systems with a return air filter grille or multiple filter grilles, can have a filter installed at each of the return air openings. Your HVAC professional can show you where they have installed the filter(s).

If high efficiency filters or electronic air cleaners are used in the system, it is important that the airflow is not reduced to maximize system performance and life. Always verify that the system’s airflow is not impeded by the filtering system that has been installed, by performing a temperature rise and temperature drop test.

Keep the filter(s) clean at all times. Vacuum dirt from filter, wash with detergent and water, air dry thoroughly and reinstall.

DO NOT DOUBLE FILTER THE RETURN AIR DUCT SYSTEM. DO NOT FILTER THE SUPPLY AIR DUCT SYSTEM.

NOTE: Some filters must be resized to fit certain units and applications. See Table 14 and Figures 51 & 52.

1. 21" - .75,000(B), 90,000 & 105,000 BTUH units require removal of a 3.5 in. segment of filter and frame to get the proper width for a side filter.

2. 24.5" - 105,000 and 120,000 BTUH unit requires removal of a 7" segment of filter and frame to get the proper width for a side filter.

SAFETY
DO NOT OPERATE THE SYSTEM WITHOUT FILTERS. A PORTION OF THE DUST ENTRAINED IN THE AIR MAY TEMPORARILY LODGE IN THE AIR DUCT RUNS AND AT THE SUPPLY REGISTERS. ANY RECIRCULATED DUST PARTICLES WILL BE HEATED AND CHARRED BY CONTACT WITH THE FURNACE HEAT EXCHANGER. THIS RESIDUE WILL SOIL CEILINGS, WALLS, DRAPES, CARPET AND OTHER HOUSEHOLD ARTICLES AND MAY RESULT IN UNPLEASANT ODORS.

LUBRICATION
IMPORTANT: DO NOT attempt to lubricate the bearings on the blower motor or the induced draft blower motor. Addition of lubricants can reduce the motor life and void the warranty.

The blower motor and induced draft blower motor are permanently lubricated by the manufacturer and do not require further attention.

The blower motor and induced draft blower motor must be cleaned periodically by a qualified installer, service agency, or the gas supplier to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean. Dirty filters can restrict airflow. The motor depends upon sufficient airflow across and through it to keep from overheating.

SYSTEM OPERATION INFORMATION
Advise The Customer
1. Keep the air filters clean. The heating system will operate better, more efficiently and more economically.

2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.

3. Close doors and windows. This will reduce the heating load on the system.

4. Avoid excessive use of kitchen exhaust fans.

5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.

6. Except for the mounting platform, keep all combustible articles 3 feet from the furnace and vent system.

7. IMPORTANT: Replace all blower doors and compartment covers after servicing the furnace. Do not operate the unit without all panels and doors securely in place.

8. Explain proper operation of the system.

ANNUAL INSPECTION
• The furnace should operate for many years without excessive scale build-up in the flue passageways. However, it is recommended that a qualified installer, service agency, or the gas supplier annually inspect the flue passageways, the vent system and the main burners for continued safe operation. Pay particular attention to deterioration from corrosion or other sources.

• IMPORTANT: It is recommended that at the beginning of the heating season, a visual inspection be made of the main burner flames for the desired flame appearance by a qualified installer, service agency or the gas supplier. If the flames are distorted and/or there is evidence of back pressure, check the vent and inlet air system for blockage. If there is carbon and scale in the heat exchanger tubes, the heat exchanger assembly should be replaced.

WARNING
HOLES IN THE VENT PIPE OR HEAT EXCHANGER CAN CAUSE TOXIC FUMES TO ENTER THE HOME, RESULTING IN CARBON MONOXIDE POISONING OR DEATH. THE VENT PIPE OR HEAT EXCHANGER MUST BE REPLACED IF THEY LEAK.

• IMPORTANT: It is recommended that at the beginning of the heating season, the flame sensor be cleaned with steel wool by a qualified installer, service agency or the gas supplier.

• IMPORTANT: It is recommended that at the beginning of the heating season, the condensate trap be inspected for debris or blockage and be filled with water. A blocked condensate trap can cause water to back up into the primary heat exchanger and lead to nuisance tripping of the overtemperature switches.

• IMPORTANT: It is recommended that at the beginning of the heating season, the condensate neutralizer if used be replaced by a qualified installer, service agency or the gas supplier.

• IMPORTANT: It is recommended that an annual inspection and cleaning of all furnace markings be made to assure legibility. Attach a replacement marking, which can be obtained through the distributor, if any are found to be illegible or missing.

TROUBLESHOOTING
Refer to Figure 53.

There are four diagnostic LED’s on the furnace control. These are labeled flame, status, power and CFM.
**FLAME LED**
The **FLAME** LED is an indication of the presence of flame.

- **OFF** – No flame is detected.
- **Rapid Blink** – Unexpected Flame
- **Slow Blink** – Marginal Flame Sense
- **Steady ON** – Normal Flame Detected

**STATUS LED**
The **STATUS** LED is an indication of a fault present.

- **Steady ON** – Normal Fault detected.
- **1 Blink** – Ignition failure – 1 HR lockout
- **2 Blinks** – Pressure switch stuck open – switch will not close when inducer is on.
- **3 Blinks** – Limit switch open – main limit or roll-out control.
- **4 Blinks** – Pressure switch stuck closed. Switch will not open.
- **5 Blinks** – Not applicable.
- **6 Blinks** – Line and Neutral reversed.

**POWER LED**
The **POWER** LED is an indication of 24ac power to the board.

- **OFF** – No power (24VAC) to control board.
- **ON** – Control is powered.

**CFM LED**
The **CFM** LED is an indication of target airflow. This is a reasonably close approximation of the airflow pushed by the blower motor through the furnace. Because of manufacturing and measurement tolerances, air density, humidity, ambient air temperature and other things, the CFM actually measured may vary significantly from this target value.

One Blink represents 100 CFM of target airflow. A half blink represents approx. 50 CFM. When the blink sequence is complete, there will be a noticeable pause of approximately one second before the sequence repeats. For example, if eleven and one half blinks are counted followed by a one second pause and then eleven and one half blinks are counted again, the target airflow is approximatley 1150 CFM. Because the resolution of this method is only 50 CFM (half-blinks), the actual target CFM could be anywhere between 1125 CFM and 1175 CFM. And, since this is TARGET airflow, the actual airflow measured could be much different than this.

The **CFM** LED is intended to be for reference only. The CFM airflow reported by the furnace control through blinks of this LED should be only used as a guide to determine APPROXIMATE airflow and is not intended as a laboratory-grade instrument for determining precise airflow through the furnace.

**WIRING DIAGRAMS**
Figures 54 and 55 are complete wiring diagrams for the furnace.
TWO-STAGE INTEGRATED FURNACE CONTROL (IFC) TROUBLESHOOTING GUIDE USING TWO-STAGE THERMOSTAT

NOTE: Most failures are not due to the IFC. Double check all other possibilities, including the ground connection, before replacing the IFC.

START
1. Set IOM switch to AUTO.
2. Set thermostat to called heat set temp, differential 3 to 1/2°F.
3. Ensure unit is High-fire (W1 to G = 24V and W2 to G = 24V).

PREPARE
Does the IOM Start on High Speed? NO

Furnace
Does the fan run on high speed for at least 5 seconds? NO
- Check IFC, SM, and PS.
- Check for proper ground between IFC and SM.
- Check for proper connections between IFC and SM.
- Check for proper connections between IFC and PSC.
- Check for proper connections between IFC and PS.
- Check for proper connections between IFC and EM.

EM Run for 5 sec. Low-speed: NO
- Check IFC, SM, and PS.
- Check for proper ground between IFC and SM.
- Check for proper connections between IFC and SM.
- Check for proper connections between IFC and PSC.
- Check for proper connections between IFC and PS.
- Check for proper connections between IFC and EM.

IGNITION TRIAL
Does Main Burner (M) Energizes? NO
- Check for proper ground between IFC and SM.
- Check for proper connections between IFC and SM.
- Check for proper connections between IFC and PSC.
- Check for proper connections between IFC and PS.
- Check for proper connections between IFC and EM.

Furnace
Does the Fan run at High Speed? NO
- Check IFC, SM, and PS.
- Check for proper ground between IFC and SM.
- Check for proper connections between IFC and SM.
- Check for proper connections between IFC and PSC.
- Check for proper connections between IFC and PS.
- Check for proper connections between IFC and EM.

IBM "ON" DELAY
Does IBM Start on High Speed? NO
- Check IFC, SM, and PS.
- Check for proper ground between IFC and SM.
- Check for proper connections between IFC and SM.
- Check for proper connections between IFC and PSC.
- Check for proper connections between IFC and PS.
- Check for proper connections between IFC and EM.

STEADY HEAT HIGH
Does main burner remain lit until heat call ends? NO
- Check IFC, SM, and PS.
- Check for proper ground between IFC and SM.
- Check for proper connections between IFC and SM.
- Check for proper connections between IFC and PSC.
- Check for proper connections between IFC and PS.
- Check for proper connections between IFC and EM.

WARNING
HAZARDOUS VOLTAGE LINE CONNECTIONS
DISCONNECT POWER BEFORE SERVICING. SERVICE MUST BE PERFORMED BY A TRAINED, QUALIFIED SERVICE TECHNICIAN.

KEY TO ABBREVIATIONS
EM = Electronic Module (electrically commutated motor)
IFC = Forced Blower Motor (air blower motor)
RC = Return Check Valve (horsehead boiler)
PS = Pressure Switch (Ps)
PSC = Permanent Split Capacitor Motor
SE = Spark Electrode

BLINK CODES - STATUS (Green) LED:
1 Blink = Fault Reset System
2 Blows = PS Circuit Open
3 Blows = PS Circuit Closed
4 Blows = PS Circuit Closed
5 Blows = PS Circuit Open
6 Blows = PS Circuit Open
7 Blows = PS Circuit Open
8 Blows = PS Circuit Open
9 Blows = PS Circuit Open
0 Blows = PS Circuit Open

FLAME (Amber) LED:
No Flame - No Flame
Slow Blown - Slow Blown
Rapid Blown - Rapid Blown
Steady On - Steady On

NOTE: If FIC goes into backup ("STATUS" LED will flash code "T"), shut off main power to unit, wait 30 seconds and then reset power.
FIGURE 53
TROUBLESHOOTING CHART (CONTINUED)

REPEAT THIS PROCEDURE UNTIL TROUBLE-FREE OPERATION IS OBTAINED.