INSTALLATION INSTRUCTIONS

FOR UPFLOW, DOWNFLOW/HORIZONTAL HIGH EFFICIENCY CONDENSING TWO-STAGE GAS FURNACES

RGRM, RGTM SERIES



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.

BA001-v2

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

ENERGY STAR

member gama

DESIGN CERTIFIED

CERTIFIED

Accredited by the RvA

ABS Quality Evaluations, Inc. Management System Certification

ANAB ACCREDITED

ISO 9001:2008

Certificate Number: 30164

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 OEHHA (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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GENERAL INFORMATION

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 RGTM 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.
Batterymarch 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.

NOTE: Models having option code 320 added at the end of the model number designation are shipped factory ready for a horizontal only installation. The drain trap for downflow installation is not included in the parts bag for these appliances.

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

FIGURE 1

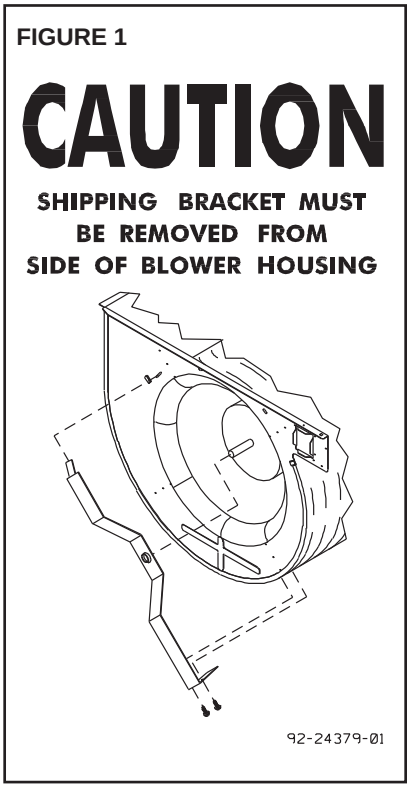
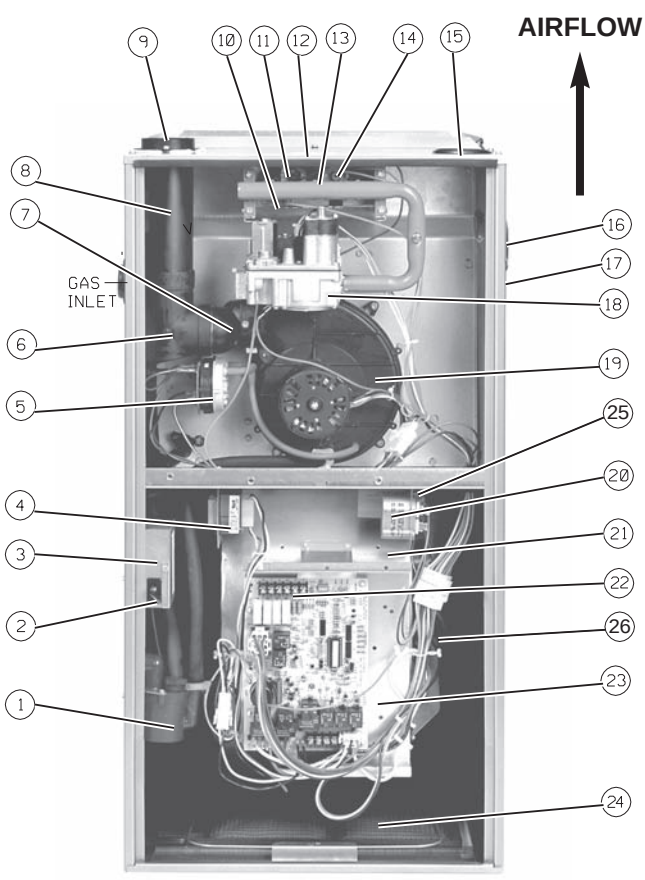
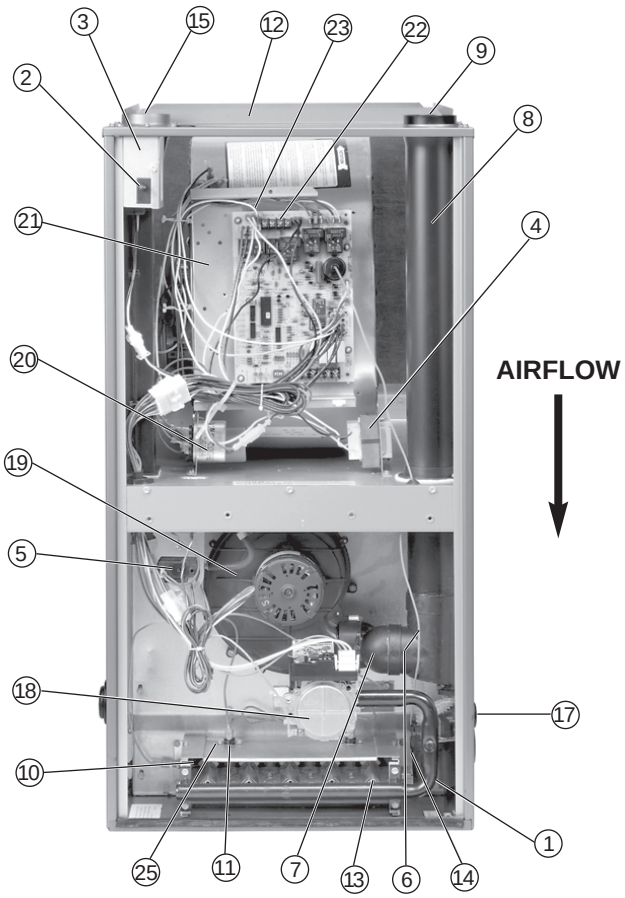


FIGURE 2

UPFLOW FURNACE COMPONENTS



DOWNFLOW/HORIZONTAL FURNACE COMPONENTS



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

*****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.

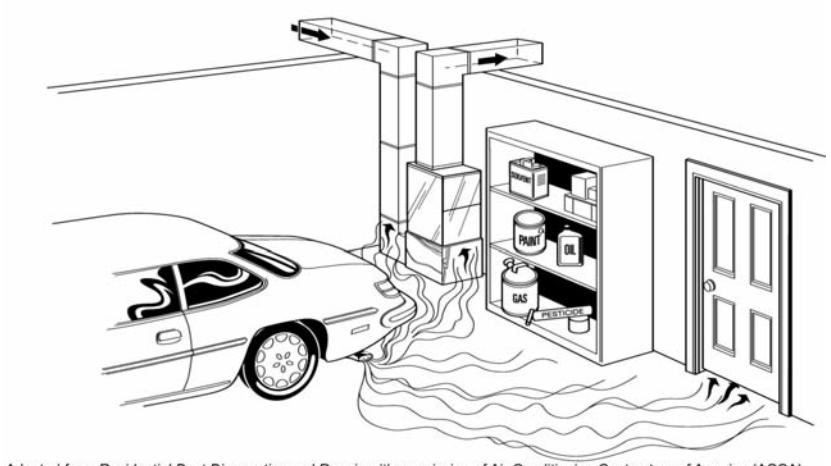
Proper balance and sealing of the duct system improves the efficiency of the heating and air conditioning system and improves the indoor air quality of the home by reducing the amount of airborne pollutants that enter homes from spaces where the ductwork and / or equipment is located. The manufacturer 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.**

FIGURE 3
MIGRATION OF DANGEROUS SUBSTANCES, FUMES, AND ODORS INTO LIVING SPACES



Adapted from *Residential Duct Diagnostics and Repair,* with permission of Air Conditioning Contractors of America (ACCA).

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).

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:
- ANSI/NFPA No. 70-(Latest Edition) National Electrical Code.
- 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 horizontal 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 horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery 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)1 through 4:

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

2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

(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 ENTRAINED IN THE AIR MAY TEMPORARILY LODGE IN THE AIR DUCT RUNS AND AT THE SUPPLY REGISTERS. ANY CIRCULATED DUST PARTICLES WILL BE HEATED AND CHARRED BY CONTACT WITH THE FURNACE HEAT EXCHANGER. THIS SOOTY 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 UNTRIMMED.

⚠ 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. 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.

⚠ 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.**

⚠ WARNING

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

INSTALLATION MUST COMPLY WITH ALL INSTALLATION INSTRUCTIONS INCLUDING:

- **PROPER VENT INSTALLATION;**
- **FURNACE OPERATING UNDER THERMOSTATIC CONTROL;**
- **RETURN AIR DUCT SEALED TO THE FURNACE;**
- **AIR FILTERS IN PLACE;**
- **SET FURNACE INPUT RATE AND TEMPERATURE RISE PER RATING PLATE MARKING;**
- **MEANS FOR PROVIDING OUTDOOR AIR REQUIRED FOR COMBUSTION;**
- **RETURN AIR TEMPERATURE MAINTAINED BETWEEN 55°F (13°C) AND 80°F (27°C); AND**
- **CLEAN FURNACE, DUCT WORK AND COMPONENTS UPON SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROCESS, AND VERIFY FURNACE OPERATING CONDITIONS INCLUDING IGNITION, INPUT RATE, TEMPERATURE RISE AND VENTING, ACCORDING TO THE INSTRUCTIONS AND CODES.**

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).

LOCATION REQUIREMENTS AND CONSIDERATIONS

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.

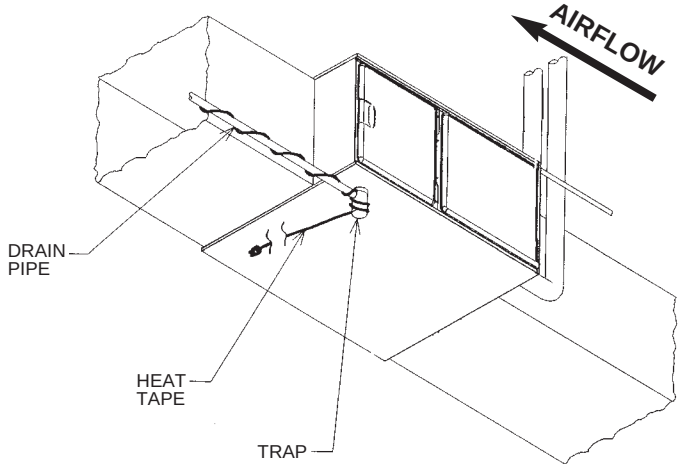
   If these are manual dampers, they must be equipped to prevent heating or cooling operation unless the damper is in the full heat or cool position.
3. **IMPORTANT:** Install the furnace level. If it is not level, condensate cannot drain properly, possibly causing furnace shut down.

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.

   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.
5. **IMPORTANT:** If installing in a utility room, be sure the door is wide enough to:
   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.

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.

⚠ 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

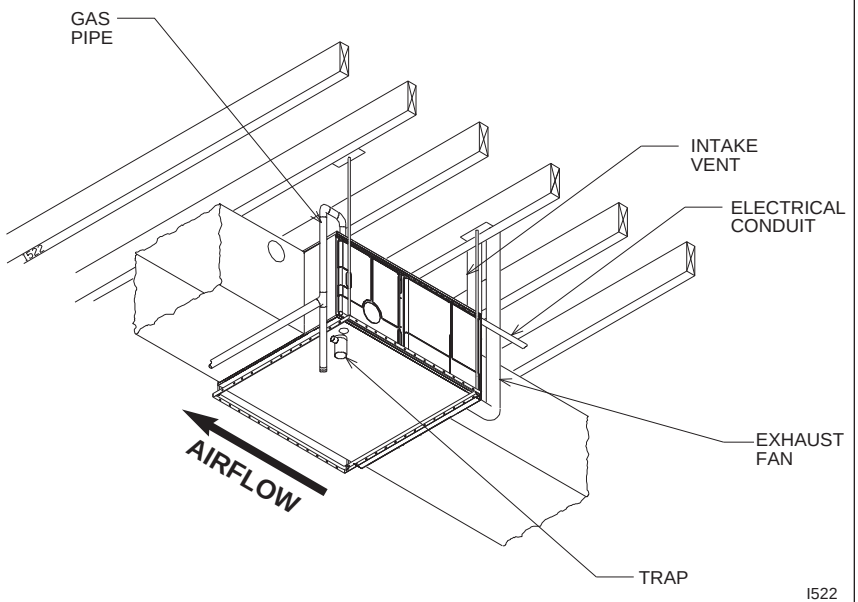
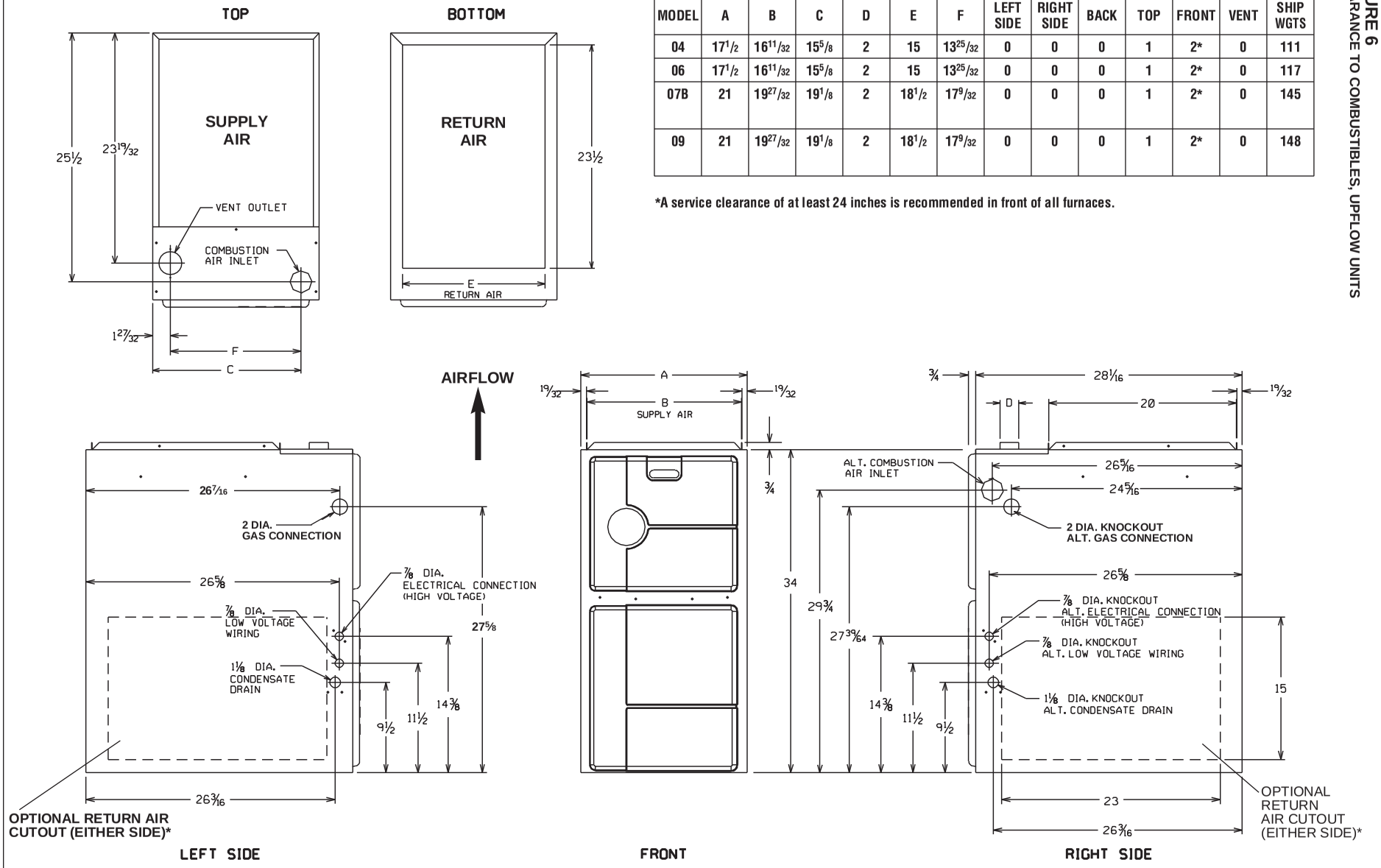


FIGURE 6
CLEARANCE TO COMBUSTIBLES, UPFLOW UNITS

UPFLOW MODELS							CLEARANCE TO COMBUSTIBLES (IN.)						
MODEL	A	B	C	D	E	F	LEFT SIDE	RIGHT SIDE	BACK	TOP	FRONT	VENT	SHIP WGTS
04	17 1/2	16 11/32	15 5/8	2	15	13 25/32	0	0	0	1	2*	0	111
06	17 1/2	16 11/32	15 5/8	2	15	13 25/32	0	0	0	1	2*	0	117
07B	21	19 27/32	19 1/8	2	18 1/2	17 9/32	0	0	0	1	2*	0	145
09	21	19 27/32	19 1/8	2	18 1/2	17 9/32	0	0	0	1	2*	0	148

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



*BOTH SIDES FOR 1800 CFM AND ABOVE

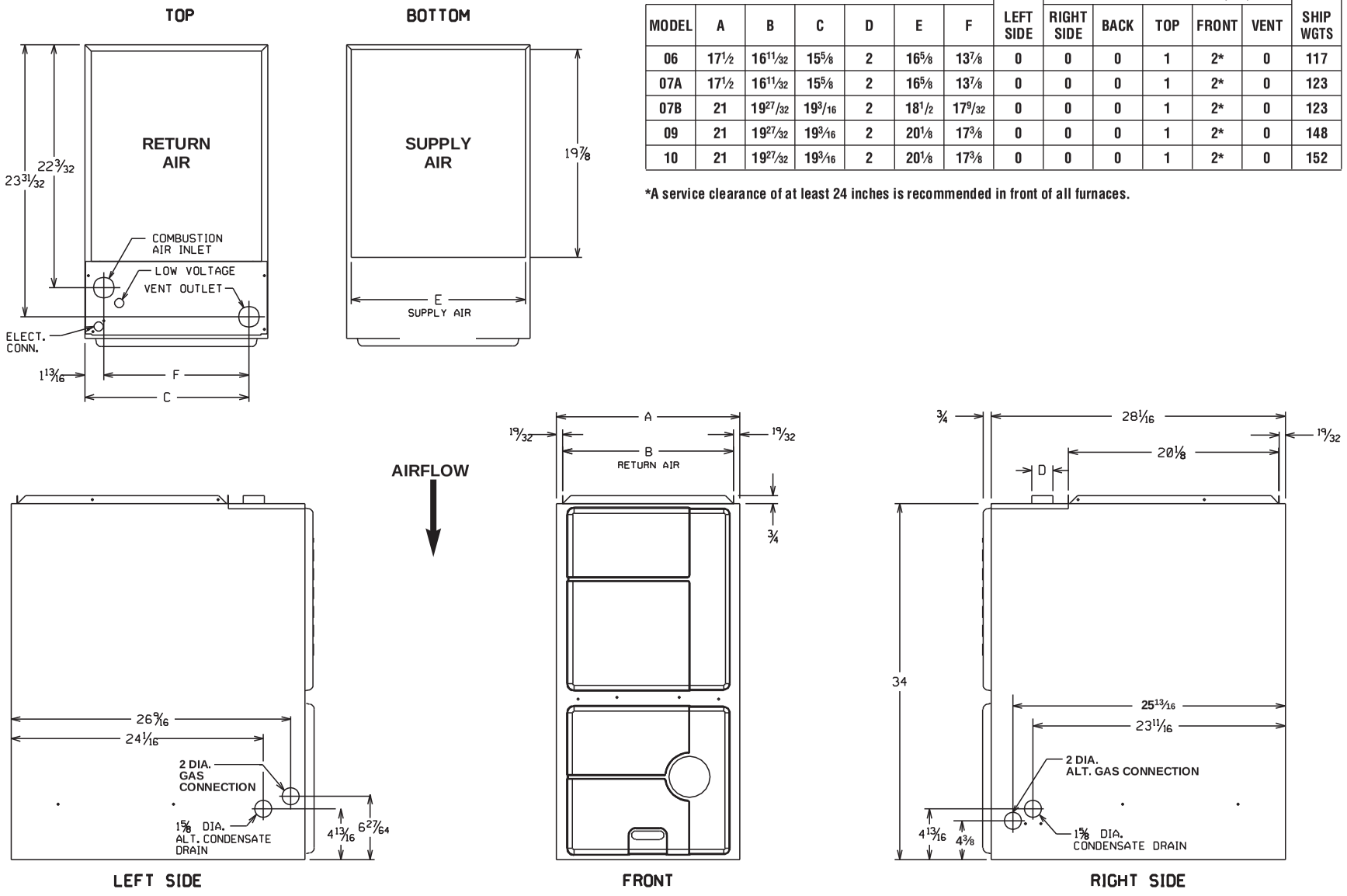
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FIGURE 7
CLEARANCE TO COMBUSTIBLES, DOWNFLOW UNITS

DOWNFLOW MODELS								MINIMUM CLEARANCE (IN.)					
MODEL	A	B	C	D	E	F	LEFT SIDE	RIGHT SIDE	BACK	TOP	FRONT	VENT	SHIP WGTS
06	17½	16 11/32	15 5/8	2	16 5/8	13 7/8	0	0	0	1	2*	0	117
07A	17½	16 11/32	15 5/8	2	16 5/8	13 7/8	0	0	0	1	2*	0	123
07B	21	19 27/32	19 3/16	2	18 1/2	17 9/32	0	0	0	1	2*	0	123
09	21	19 27/32	19 3/16	2	20 1/8	17 3/8	0	0	0	1	2*	0	148
10	21	19 27/32	19 3/16	2	20 1/8	17 3/8	0	0	0	1	2*	0	152

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



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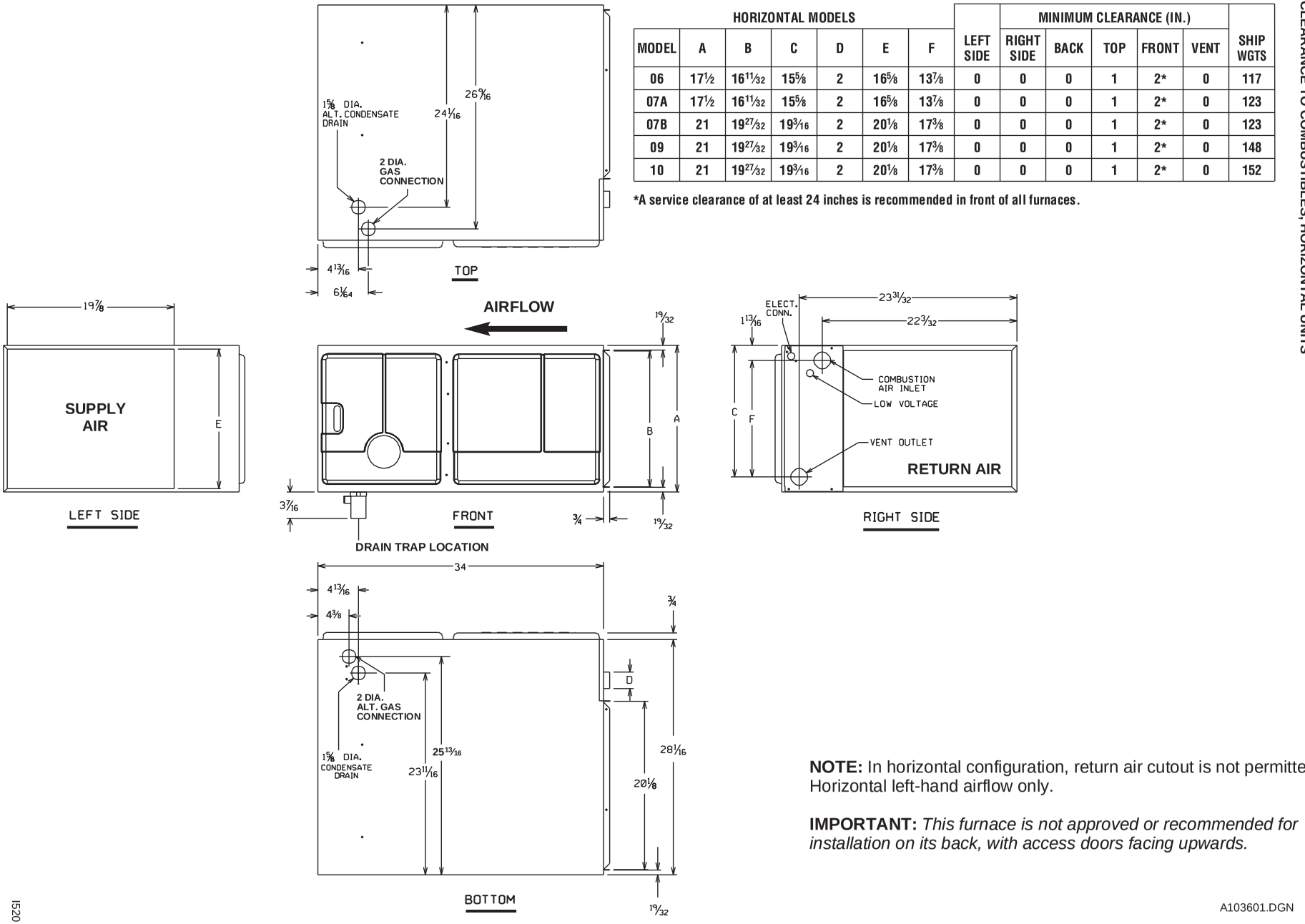
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NOTE: IN DOWNFLOW CONFIGURATION, RETURN AIR CUTOUT IS NOT PERMITTED.

FIGURE 8
CLEARANCE TO COMBUSTIBLES, HORIZONTAL UNITS

HORIZONTAL MODELS								MINIMUM CLEARANCE (IN.)					
MODEL	A	B	C	D	E	F	LEFT SIDE	RIGHT SIDE	BACK	TOP	FRONT	VENT	SHIP WGTS
06	17½	16 11/32	15 5/8	2	16 5/8	13 7/8	0	0	0	1	2*	0	117
07A	17½	16 11/32	15 5/8	2	16 5/8	13 7/8	0	0	0	1	2*	0	123
07B	21	19 27/32	19 3/16	2	20 1/8	17 3/8	0	0	0	1	2*	0	123
09	21	19 27/32	19 3/16	2	20 1/8	17 3/8	0	0	0	1	2*	0	148
10	21	19 27/32	19 3/16	2	20 1/8	17 3/8	0	0	0	1	2*	0	152

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



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.*

I520

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DUCTING

Proper air flow is required for the correct operation of this furnace. Too little air flow 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.

⚠ WARNING

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, TAPED. 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.

IMPORTANT: 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.

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

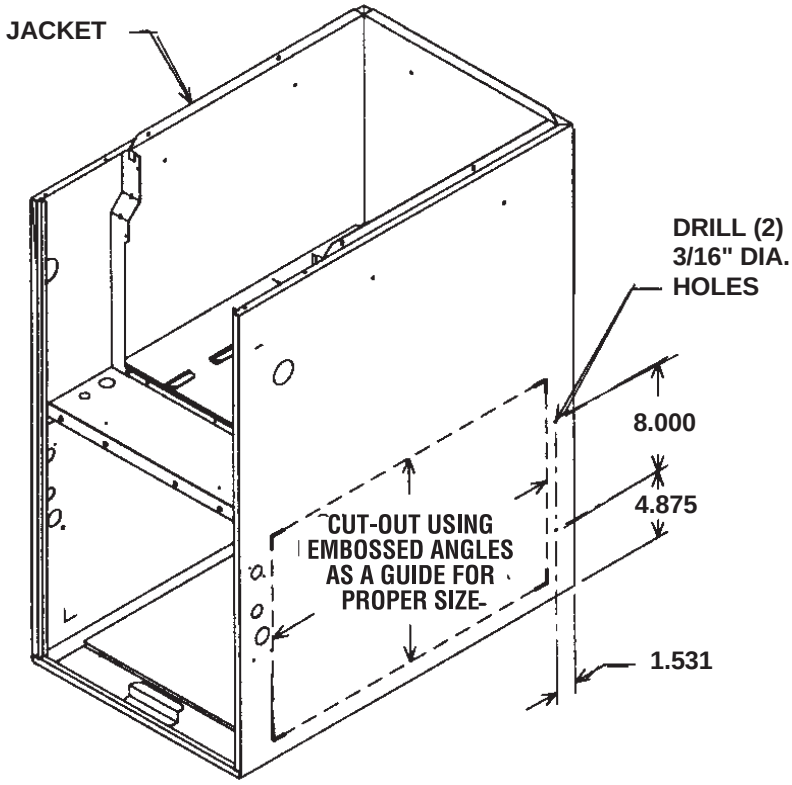
3. Connect the return duct or return air cabinet to the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.
4. **Be sure to have adequate space for the unit filter.**

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

   NOTE: DO NOT use a rear air return.
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.

FIGURE 9
UPFLOW CUTOUT AND DRILL INFORMATION



14

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 air tight to prevent entraining 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.**

TABLE 1
NON-COMBUSTIBLE FLOOR BASES

Floor Base No.	Size Cabinet
(-)XGC-B17	17
(-)XGC-B21	21
(-)XGC-B24	24

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

HORIZONTAL UNIT

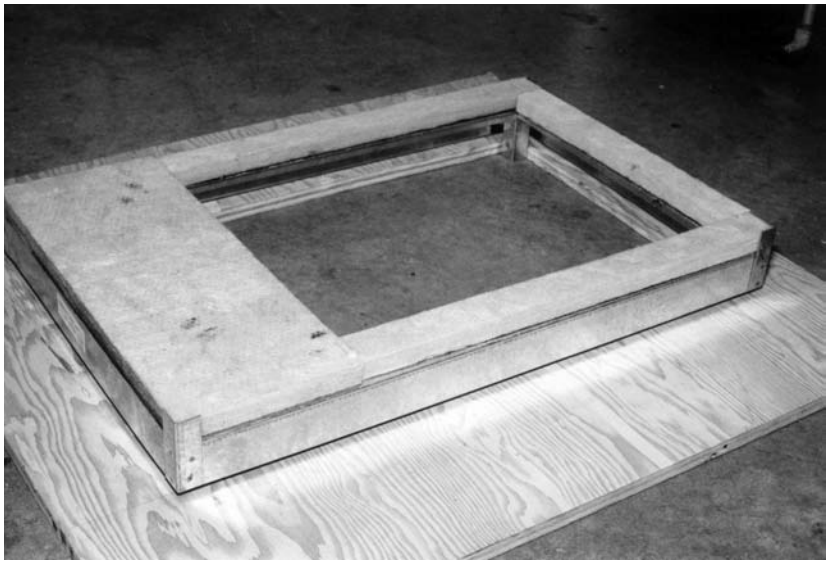
IMPORTANT: THIS FURNACE MAY ONLY BE INSTALLED SO AS WHEN FACING THE FRONT OF THE FURNACE, SUPPLY AIR IS DISCHARGED ON THE LEFT HAND SIDE.

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 air tight to prevent pulling 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.

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), D2665 (PVC-DWV), 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 OF 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 40PVC-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 CLOSET, 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 thermostat 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.

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.

PIPE & FITTING MATERIAL	ASTM SPECIFICATION
Schedule 40 PVC (Pipe)	D1785
Schedule 40 PVC (Cellular Core Pipe)	F891
Schedule 40 PVC (Fittings)	D2466
SDR-21PVC (Pipe)	D2241
SDR-26 PVC (Pipe)	D2241
Schedule 40 ABS Cellular Core DWV (Pipe)	F628
Schedule 40 ABS (Pipe)	D1527
Schedule 40 ABS (Fittings)	D2468
ABS-DWV (Drain Waste & Vent) (Pipe & Fittings)	D2661
PVC-DWV (Drain Waste & Vent) (Pipe & Fittings)	D2665

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:

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine-based swimming pool chemicals
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Cements and glues
- Antistatic fabric softeners for clothes dryers
- Masonry 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.

⚠ WARNING

ALL FURNACE INSTALLATIONS MUST COMPLY WITH THE NATIONAL FUEL GAS CODE AND LOCAL CODES TO PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR FOR THE FURNACE. FAILURE TO DO SO CAN RESULT IN EXPLOSION, FIRE, PROPERTY DAMAGE, CARBON MONOXIDE POISONING, PERSONAL INJURY OR DEATH.

Combustion air requirements are determined by whether the furnace is in an open (unconfined) area or in a confined space such as a closet or small room.

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.

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

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.

BTUH Input	Free Area Each Opening
45,000	100 square inches
60,000	100 square inches
75,000	100 square inches
90,000	100 square inches
105,000	105 square inches
120,000	120 square inches

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 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.

BTUH Input	Free Area Each Opening	Round Pipe Size
45,000	11.25 square inches	4"
60,000	15.00 square inches	5"
75,000	18.75 square inches	5"
90,000	22.50 square inches	6"
105,000	26.25 square inches	6"
120,000	30.00 square inches	6"

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:

BTUH Input	Free Area Each Opening	Round Pipe Size
45,000	22.50 square inches	6"
60,000	30.00 square inches	6"
75,000	37.50 square inches	7"
90,000	45.00 square inches	8"
105,000	52.50 square inches	8"
120,000	60.00 square inches	9"

FIGURE 11
AIR FROM HEATED SPACE

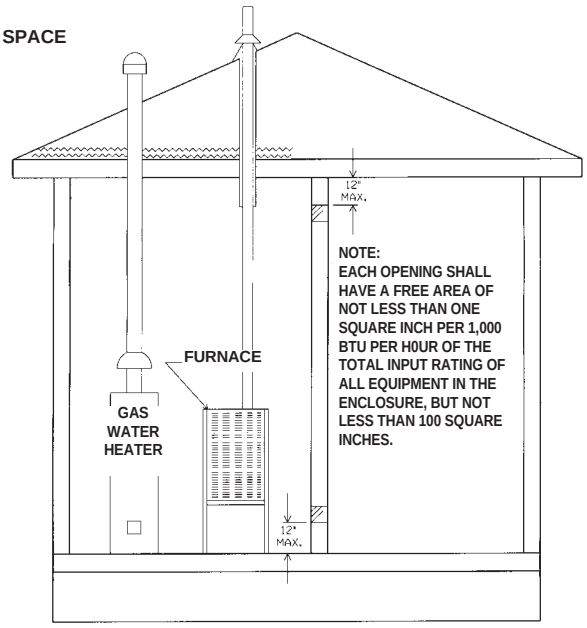


FIGURE 12
AIR FROM ATTIC/CRAWL SPACE

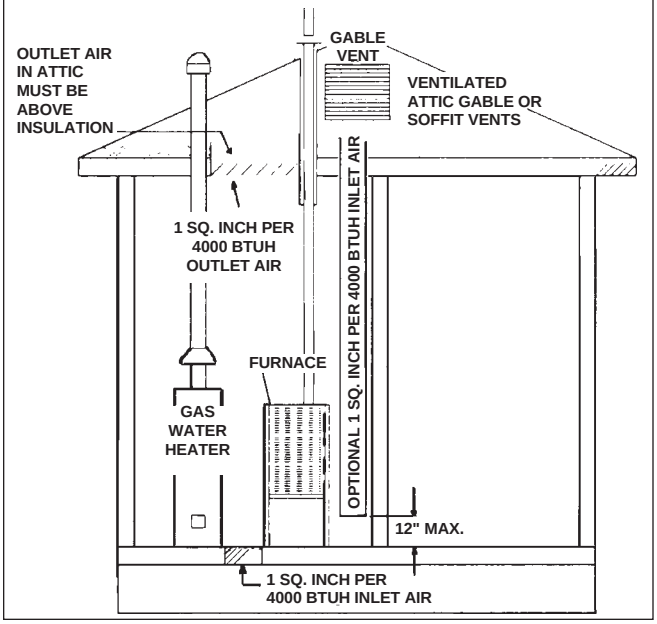
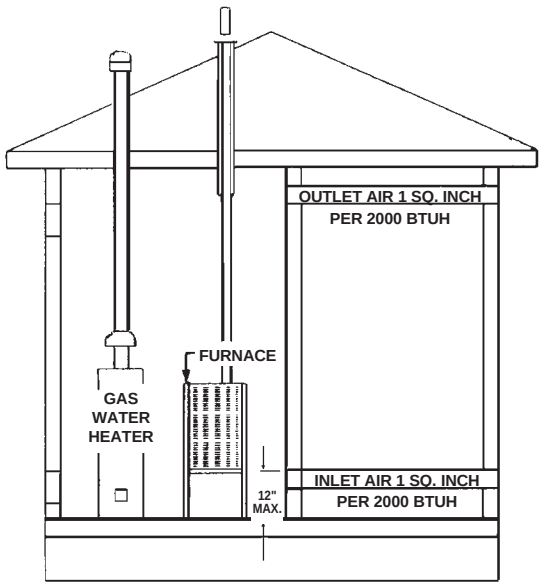


FIGURE 13
OUTSIDE AIR USING A HORIZONTAL DUCT



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

BTUH Input	Free Area Each Opening	Round Pipe Size
45,000	15.00 square inches	4"
60,000	16.67 square inches	5"
75,000	25.00 square inches	6"
90,000	30.00 square inches	6"
105,000	35.00 square inches	7"
120,000	40.00 square inches	7"

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.

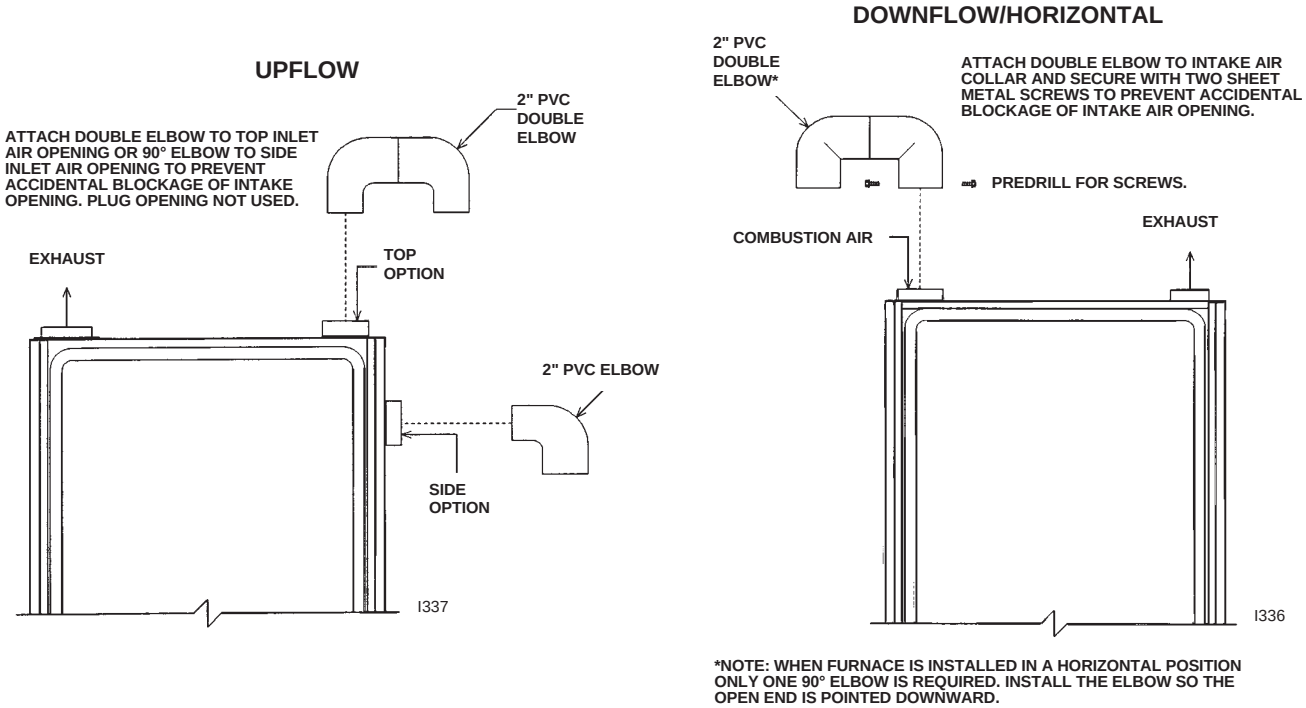
Combustion air openings must not be restricted in any manner.

CONSULT LOCAL CODES FOR SPECIAL REQUIREMENTS.

CONNECTION TO FURNACE

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

FIGURE 14
COMBUSTION AIR FITTING



VENT PIPE INSTALLATION

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 NPFA54/ 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 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

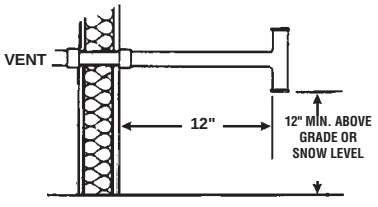


TABLE 1
UPFLOW UNITS

FOR NON-DIRECT VENT APPLICATIONS - AIR FOR COMBUSTION PROVIDED FROM INDOORS

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

FURNACE INPUT	PIPE SIZE	TERMINATION	NUMBERS OF ELBOWS *45° OR 90° Medium / Long Radius ONLY*		
			1-2	3-4	5-6
45,000	2"	Standard	60	55	50
		Alternate	55	50	45
60,000	2"	Standard	30	25	20
		Alternate	25	20	15
	3"	Standard	120	120	115
		Alternate	120	120	110
75,000	3"	Standard	45	40	NR
		Alternate	NR	NR	NR
90,000	3"	Standard	90	85	75
		Alternate	60	50	45
105,000	3"	Standard	45	40	NR
120,000	3"	Standard	70	65	55
		Alternate	40	30	25

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.

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

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

FURNACE INPUT	PIPE SIZE	TERMINATION	NUMBERS OF ELBOWS *45° OR 90° Medium / Long Radius ONLY*	
			1-2	3-4
60,000	2"	Standard	50	40
		Alternate	40	30
	3"	Standard	50	40
		Alternate	50	40
75,000	3"	Standard	50	40
		Alternate	50	40
90,000	3"	Standard	50	40
		Alternate	50	40
105,000	3"	Standard	50	40
		Alternate	50	40

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

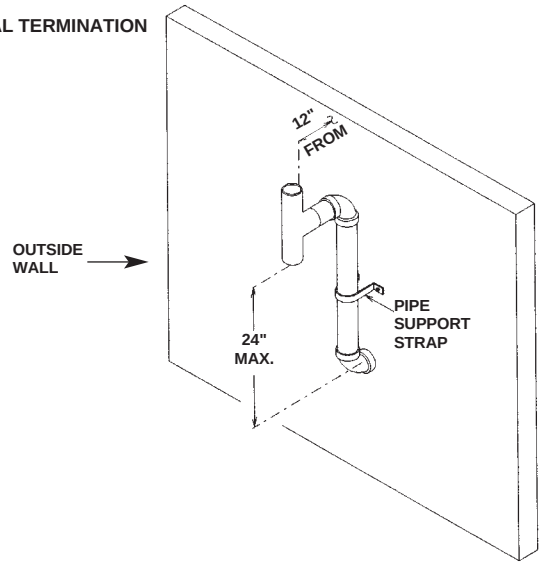
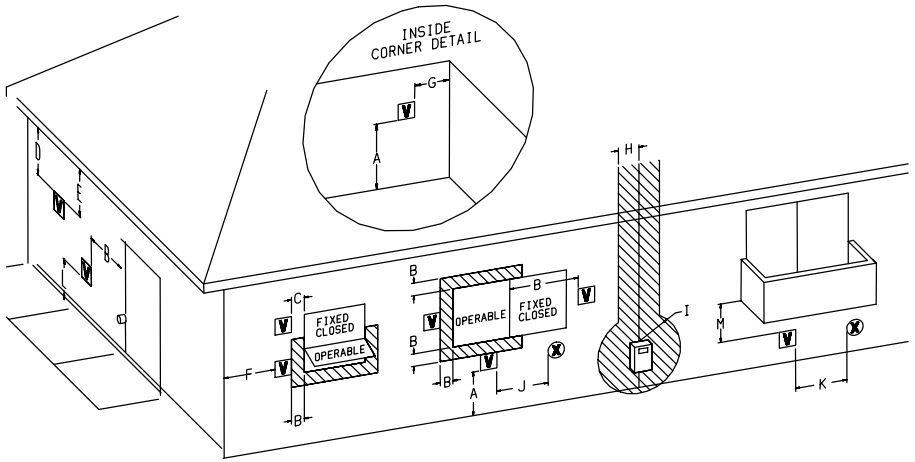


FIGURE 17
OTHER THAN DIRECT VENT TERMINAL CLEARANCES



VENT TERMINAL AIR SUPPLY INLET AREA WHERE TERMINAL IS NOT PERMITTED

		Canadian Installations[1]	US Installations[2]
A=	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B=	Clearance to window or door that may be opened	6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances > 10,000 BTUH (3 kW) and ≤100,00 BTUH (30 kW), 36 inches (91 cm) for appliances >100,00 BTUH (30 kW)	4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening
C=	Clearance to permanently closed window	*	*
D=	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	*	*
E=	Clearance to unventilated soffit	*	*
F=	Clearance to outside corner	*	*
G=	Clearance to inside corner	*	*
H=	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet above the meter/regulator assembly	*
I=	Clearance to service regulator vent outlet	3 feet (1.83 m)	*
=	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances > 10,000 BTUH (3 kW) and ≤100,00 BTUH (30 kW), 36 inches (91 cm) for appliances >100,00 BTUH (30 kW)	4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening
K=	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L=	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m) †	7 feet (2.13 m)
M=	Clearance under veranda, porch deck, or balcony	12 inches (30 cm) ‡	*

[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 manufacturerês installation instuctions."

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.**

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 are corrosion resistant.

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 NPFA54/ 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 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. 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

TABLE 3

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

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

FURNACE INPUT	PIPE SIZE	TERMINATION	VENT TERMINATION KIT RECOMMENDED	NUMBER OF ELBOWS 45 or 90 Degrees Medium / Long Radius ONLY	
				2	4
45,000	2"	Standard/Concentric	RXGY-D02/RXGY-D02A/RXGY-E03A/GXGY-G02	60	50
		Alternate	RXGY-D02/RXGY-D02A	50	40
60,000	2"	Standard/Concentric	RXGY-D02/RXGY-D02A/RXGY-E03A/RXGY-G02	40	35
		Alternate	RXGY-D02/RXGY-D02A	40	35
	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGY-E03A/RXGY-G02	60	50
		Alternate	RXGY-D03/RXGY-D03A	50	40
75,000	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGY-E03A/RXGY-G02	50	40
		Alternate	RXGY-D03/RGXY-D03A	50	40
90,000	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGY-E03A/RXGY-G02	50	40
		Alternate	RXGY-D03/RXGY-D03A	40	30
105,000	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGY-E03A/RXGY-G02	50	40
		Alternate	RXGY-D03/RGXY-D03A	50	40
120,000	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGY-E03A/RXGY-G02	50	40
		Alternate	RXGY-D04/RXGY-D04A	40	30

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-DO2/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 SUFFIX "A" ARE APPROVED FOR INSTALLATION IN CANADA.
8. NO SCREENS MAY BE USED TO COVER COMBUSTION AIR AND EXHAUST.

TABLE 4

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

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

FURNACE INPUT	PIPE SIZE	TERMINATION	VENT TERMINATION KIT RECOMMENDED	NUMBER OF ELBOWS 22.5, 45 or 90 Degrees Medium / Long Radius ONLY	
				1 - 2	3 - 4
60,000	2"	Standard/Concentric	RXGY-D02/RXGY-D02A/RXGY-E03A/RXGY-G02	50	40
		Alternate	RXGY-D02/RXGY-D02A	40	30
	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGY-E03A/RXGY-G02	50	40
		Alternate	RXGY-D03/RXGY-D03A	50	40
75,000	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGY-E03A/RXGY-G02	50	40
		Alternate	RXGY-D03/RXGY-D03A	50	40
90,000	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGY-D03A/RXGY-G02	50	40
		Alternate	RXGY-D03/RXGH-D03A	50	40
105,000	3"	Standard/Concentric	RXGY-D03/RXGY-D03A/RXGH-E03A/RXGY-G02	50	40
		Alternate	RXGY-D03/RXGY-D03A	50	40

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-DO2/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 SUFFIX "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 VERTICAL 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 2¼-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 BTU 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 2½”. Refer to Tables 3 and 4 for proper application. This must be reduced to 1½“ 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.

- 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 ran within the structure, any pipe ran 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.

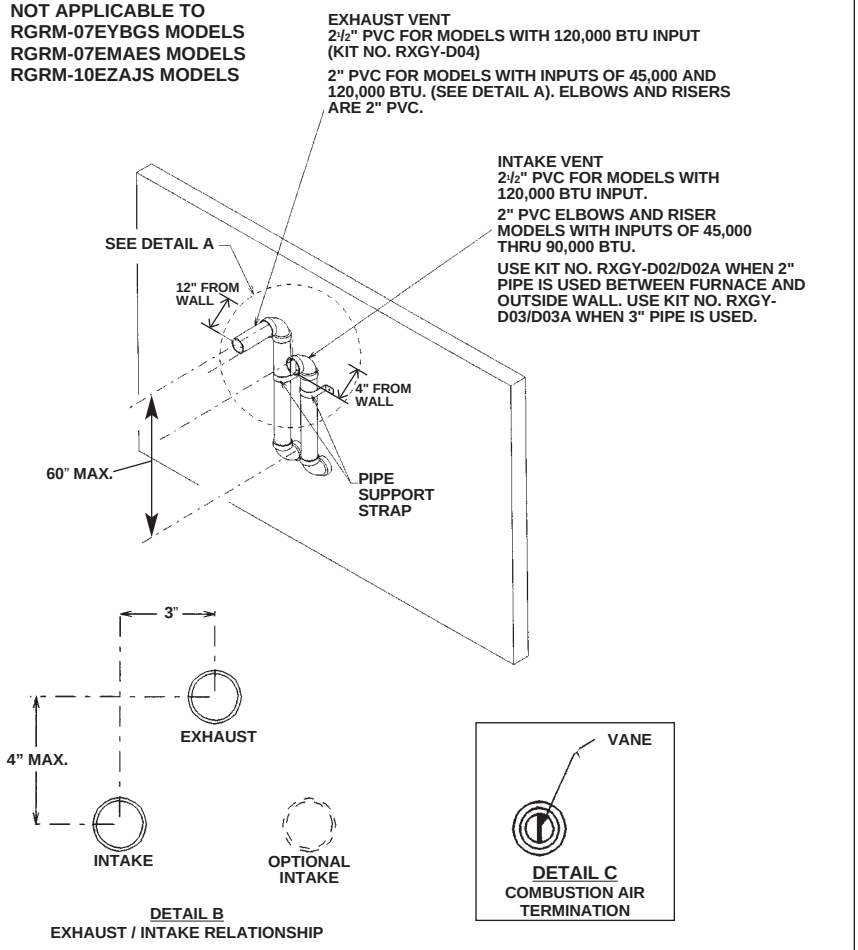
The 45,000 BTUH unit only uses kit RXGY-D02/D02A. The 60,000 BTUH and 75,000 BTUH units may use kits RXGY-D02/D02A or RXGY-D03/D03A depending on pipe lengths and number of elbows. Use kit RXGY-D03/D03A with 90,000 BTUH through 120,000 BTUH units. **The RXGY-D04/D04A kit only applies to the 120,000 BTUH 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. ½-in. PVC 6-in. dia. trap
3. PVC vane
4. 2-in. PVC elbow
5. 1½-in. PVC nipple with coupling
6. PVC strap
7. vent template

FIGURE 18
ALTERNATE HORIZONTAL DIRECT VENT TERMINATION



RXGY-D03/D03A

1. 3-in. tee with reducer assembly
2. ½-in. PVC 6-in. dia. trap
3. PVC vane
4. 2-in. PVC elbow
5. PVC strap
6. vent template

RXGY-D04/D04A

1. 2½-in. PVC elbow
2. 3" x 2½" PVC bushing
3. 2½" x 6½" long PVC pipe
4. 2½" x 16" long PVC pipe
5. 2½" x 21" long PVC pipe
6. PVC vane
7. 3-in. tee with reducer assembly
8. 6-in. dia. ½-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.

RXGY-D02A

1. 2” Tee assembly w/½” drain connection
2. ½” PVC-5” diameter trap
3. Wind deflector vane
4. Vent template

RXGY-D03A

1. 3” Tee assembly w/½” drain connection
2. ½” PVC-5” diameter trap
3. Wind deflector vane
4. Vent Template

RXGY-D04A

1. 3” Tee assembly w/½” drain connection
2. ½” PVC-6” diameter trap
3. Wind deflector vane
4. Vent template

CONCENTRIC TERMINATIONS

VERTICAL/HORIZONTAL CONCENTRIC VENT KIT NO. RXGY-E03A

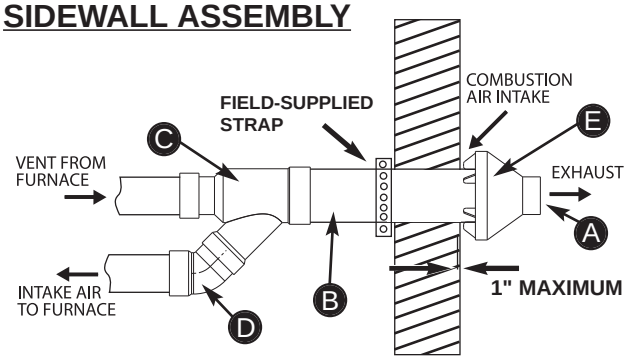
This kit is for vertical/horizontal intake air/vent runs and may be installed through roofs or sidewalls. One 5” diameter hole is required for the installation. See Figure 19 for the general layout. Complete installation instructions are included with the kit.

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

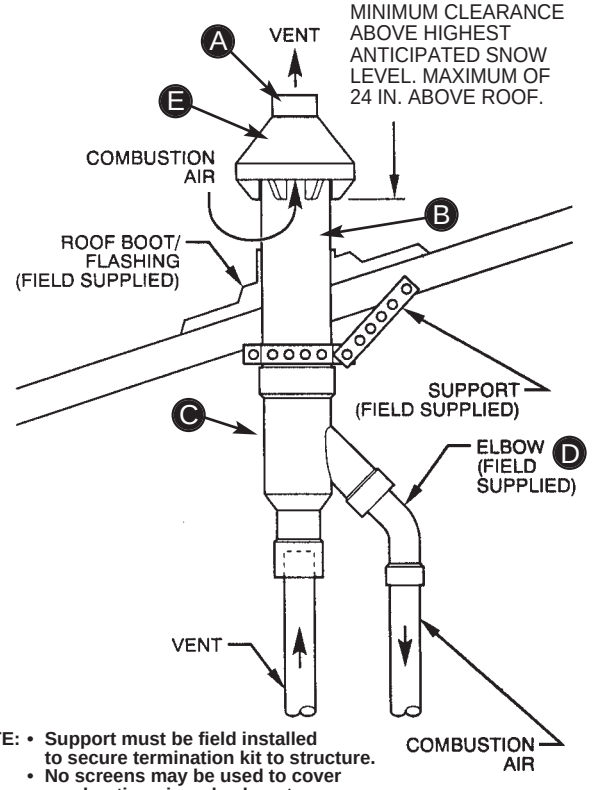
FIGURE 19
CONCENTRIC VENT KIT NO. RXGY-E03A

SIDEWALL ASSEMBLY



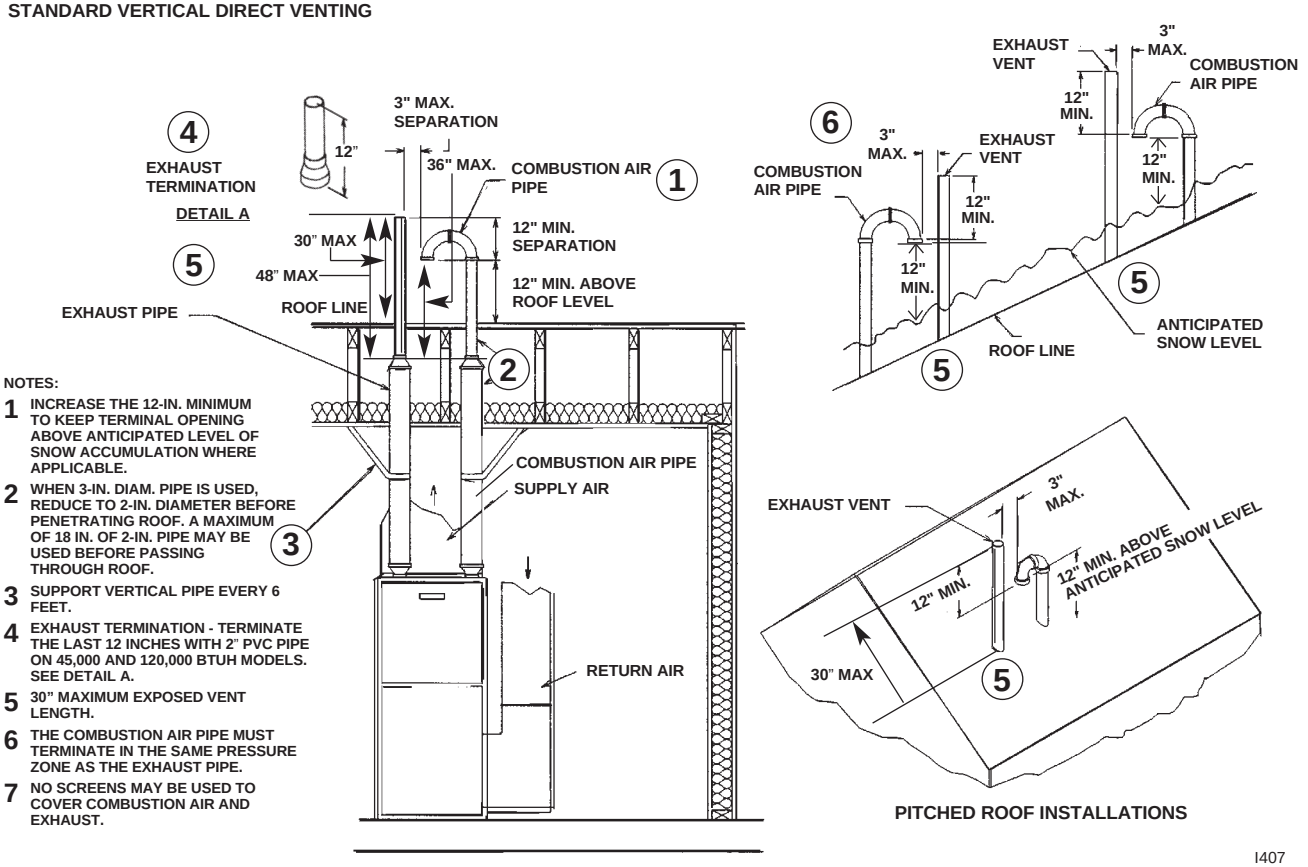
ITEM No.	DESCRIPTION
A	2.5" PVC PIPE SCHEDULE 40 -- 37.125" LONG
B	4" PVC PIPE SCHEDULE 40 -- 24" LONG
C	3" x 3" x 4" SPECIAL CONCENTRIC FITTING
D	3" x 45° STREET ELBOW (FIELD SUPPLIED)
E	PVC RAINCAP

ROOF INSTALLATION



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

FIGURE 20
STANDARD VERTICAL DIRECT VENTING



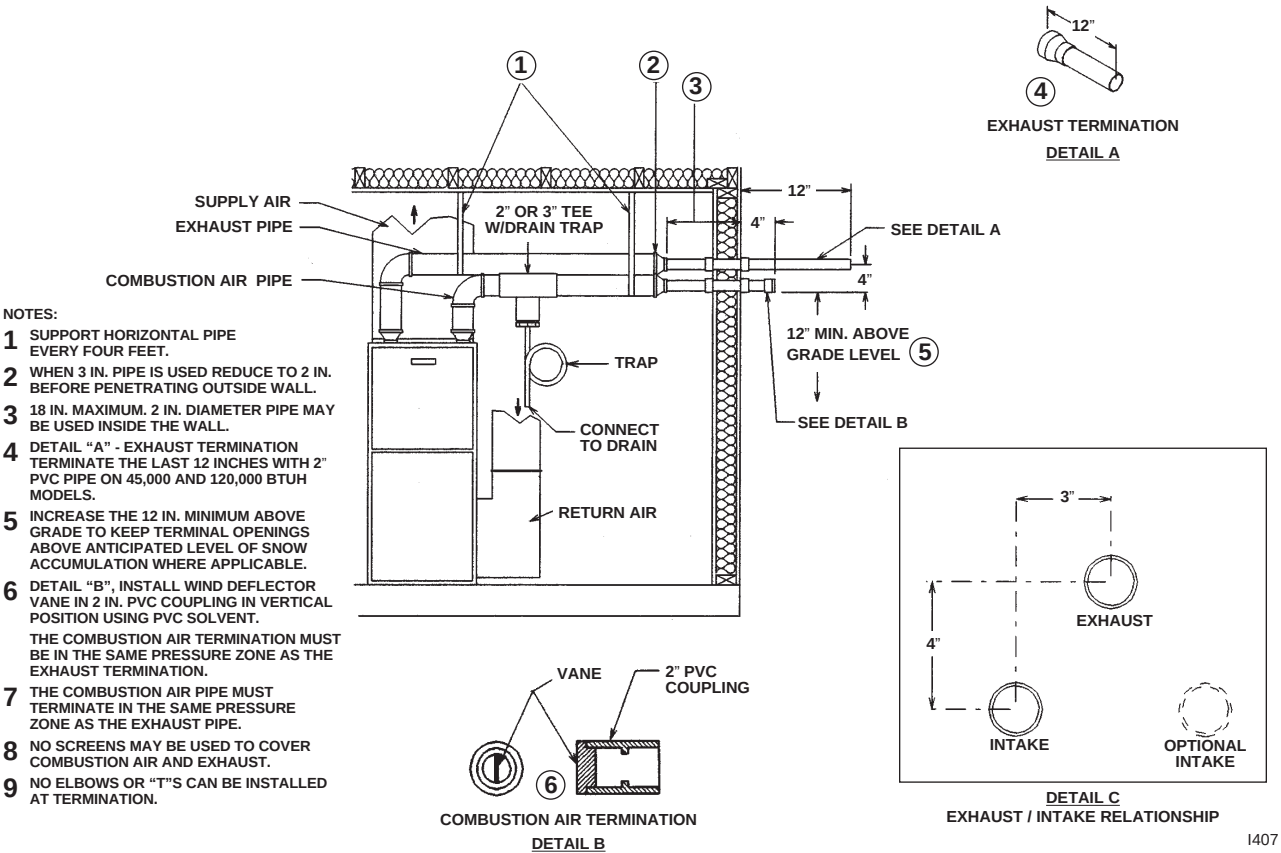
NOTES:

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.

PITCHED ROOF INSTALLATIONS

I407

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.
6. DETAIL "B", INSTALL WIND DEFLECTOR VANE IN 2 IN. PVC COUPLING IN VERTICAL POSITION USING PVC SOLVENT.

   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.

I407

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

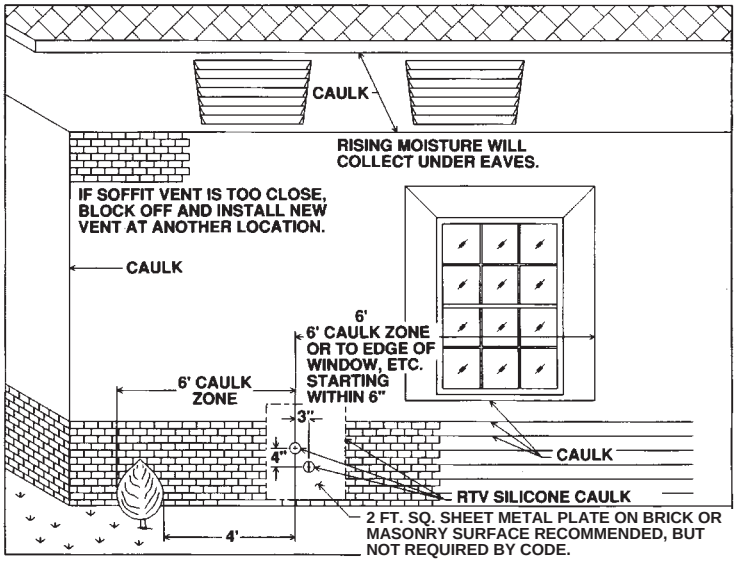
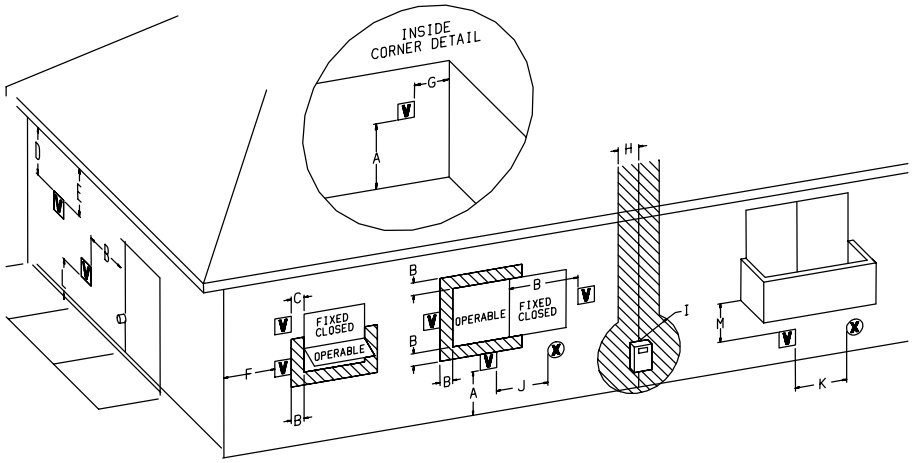


FIGURE 23
DIRECT VENT TERMINAL CLEARANCES



VENT TERMINAL AIR SUPPLY INLET AREA WHERE TERMINAL IS NOT PERMITTED

		Canadian Installations[1]	US Installations[2]
A=	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B=	Clearance to window or door that may be opened	6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances > 10,000 BTUH (3 kW) and ≤100,00 BTUH (30 kW), 36 inches (91 cm) for appliances >100,00 BTUH (30 kW)	6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 9 inches (23 cm) for appliances > 10,000 BTUH (3 kW) and ≤50,000 BTUH (15 kW), 12 inches (30 cm) for appliances > 50,000 BTUH (15 kW)
C=	Clearance to permanently closed window	*	*
D=	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	*	*
E=	Clearance to unventilated soffit	*	*
F=	Clearance to outside corner	*	*
G=	Clearance to inside corner	*	*
H=	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet above the meter/regulator assembly	*
I=	Clearance to service regulator vent outlet	3 feet (1.83 m)	*
J=	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 12 inches (30 cm) for appliances > 10,000 BTUH (3 kW) and ≤100,00 BTUH (30 kW), 36 inches (91 cm) for appliances >100,00 BTUH (30 kW)	6 inches (15 cm) for appliances ≤10,000 BTUH (3 kW), 9 inches (23 cm) for appliances > 10,000 BTUH (3 kW) and ≤50,000 BTUH (15 kW), 12 inches (30 cm) for appliances >50,000 BTUH (15 kW)
K=	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L=	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m) †	*
M=	Clearance under veranda, porch deck, or balcony	12 inches (30 cm) ‡	*

[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.

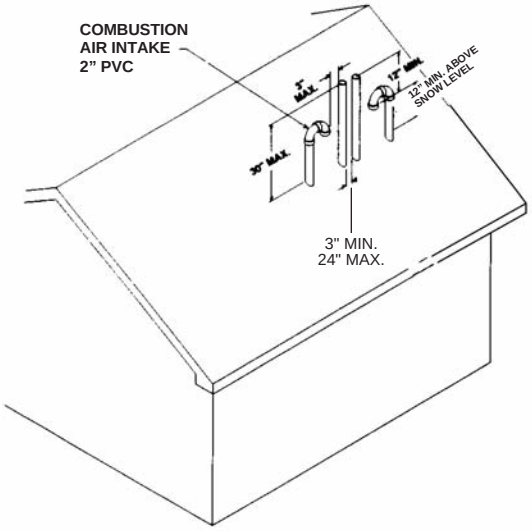
* For clearances not specified in ANSI Z223.1 / NFPA 54 or CAN/CGA-B149, one of the following shall be indicated:

a) A reference to the following footnote:

"Clearance in accordance with local installation codes, the requirements of the gas supplier and the manufacturerês installation instuctions."

FIGURE 24
TWO FURNACE VENTING THROUGH ROOF

TWO-PIPE VENTING



CONCENTRIC VENTING

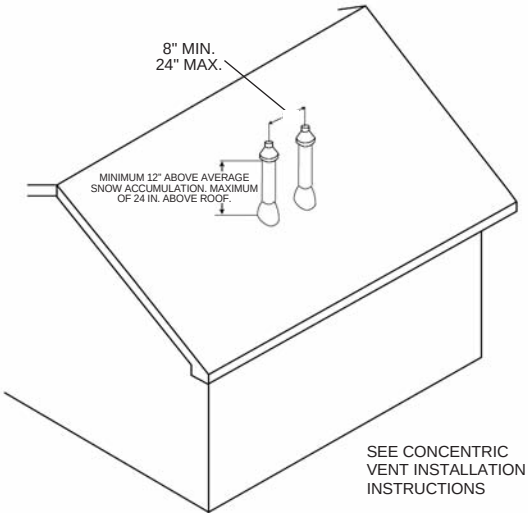
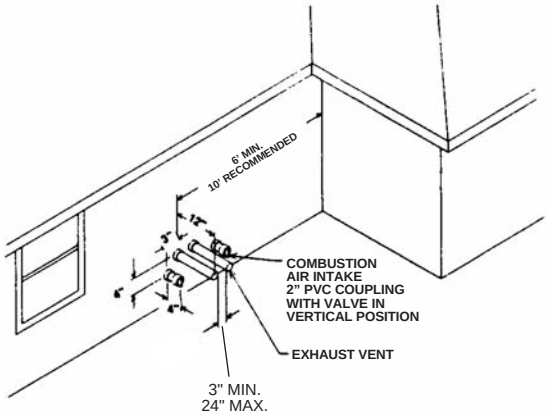
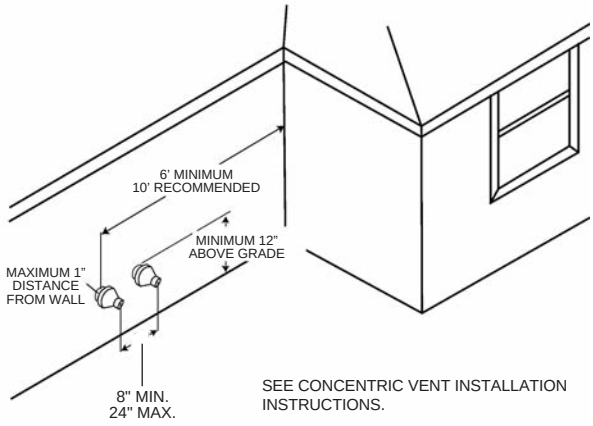


FIGURE 25
TWO FURNACE VENTING THROUGH WALL

TWO-PIPE VENTING



CONCENTRIC VENTING



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

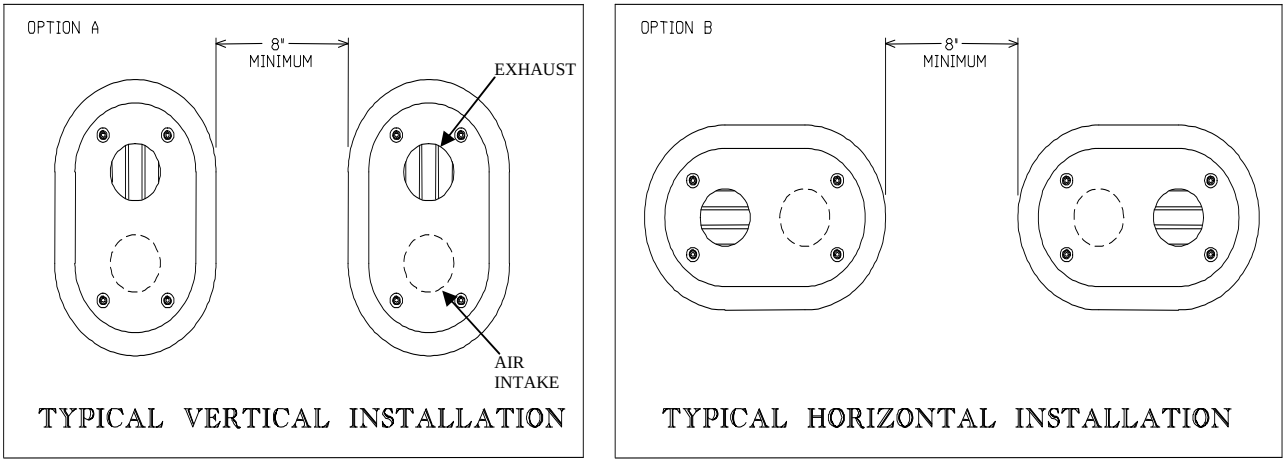
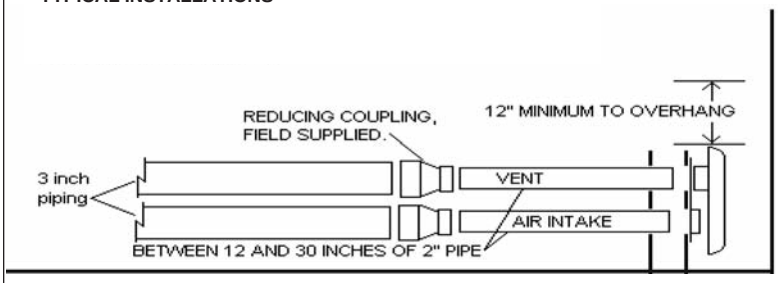


FIGURE 27
TYPICAL INSTALLATIONS



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.

FIGURE 28
UPFLOW COMBUSTION AIR AND VENT PIPE CONNECTION

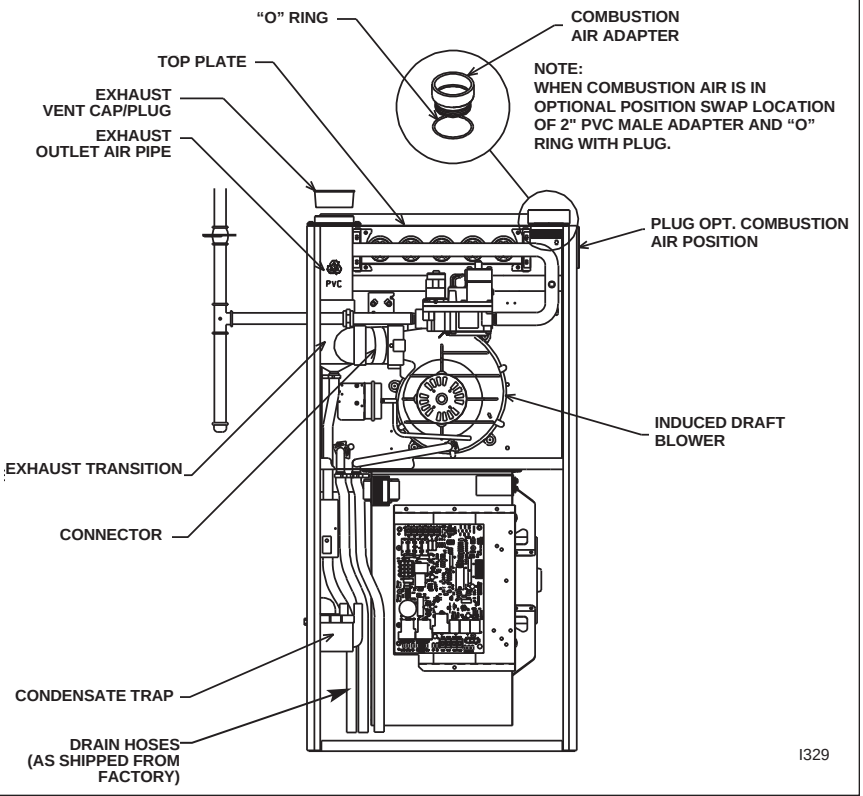
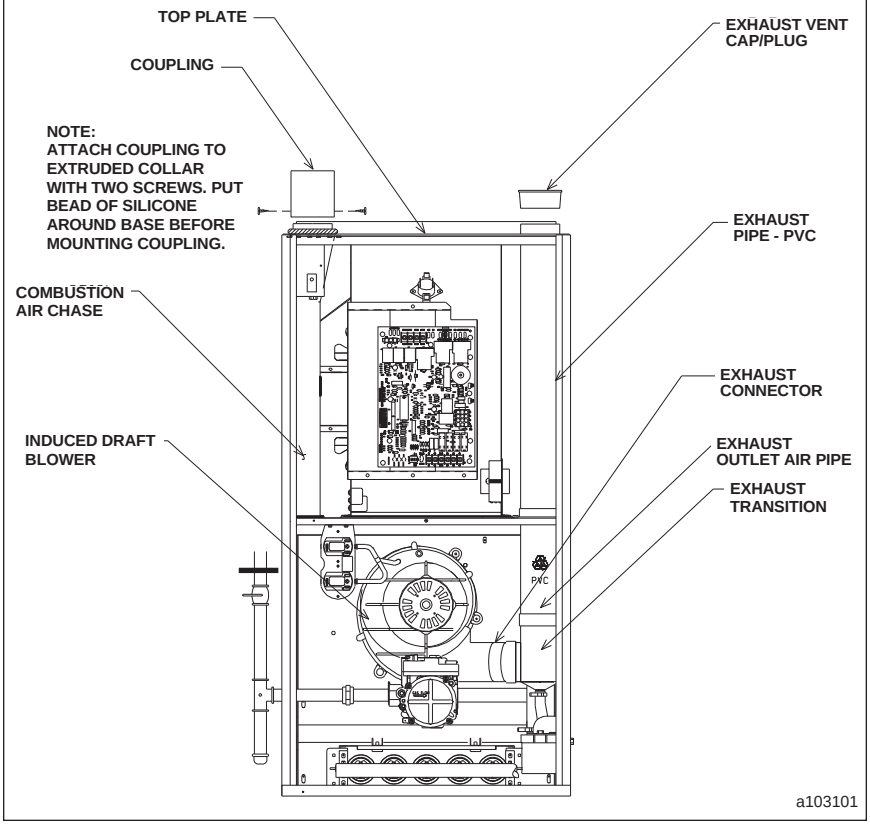


FIGURE 29
DOWNFLOW/HORIZONTAL COMBUSTION AIR AND VENT PIPE CONNECTION



CONDENSATE DRAIN/NEUTRALIZER

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 over-flow 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.

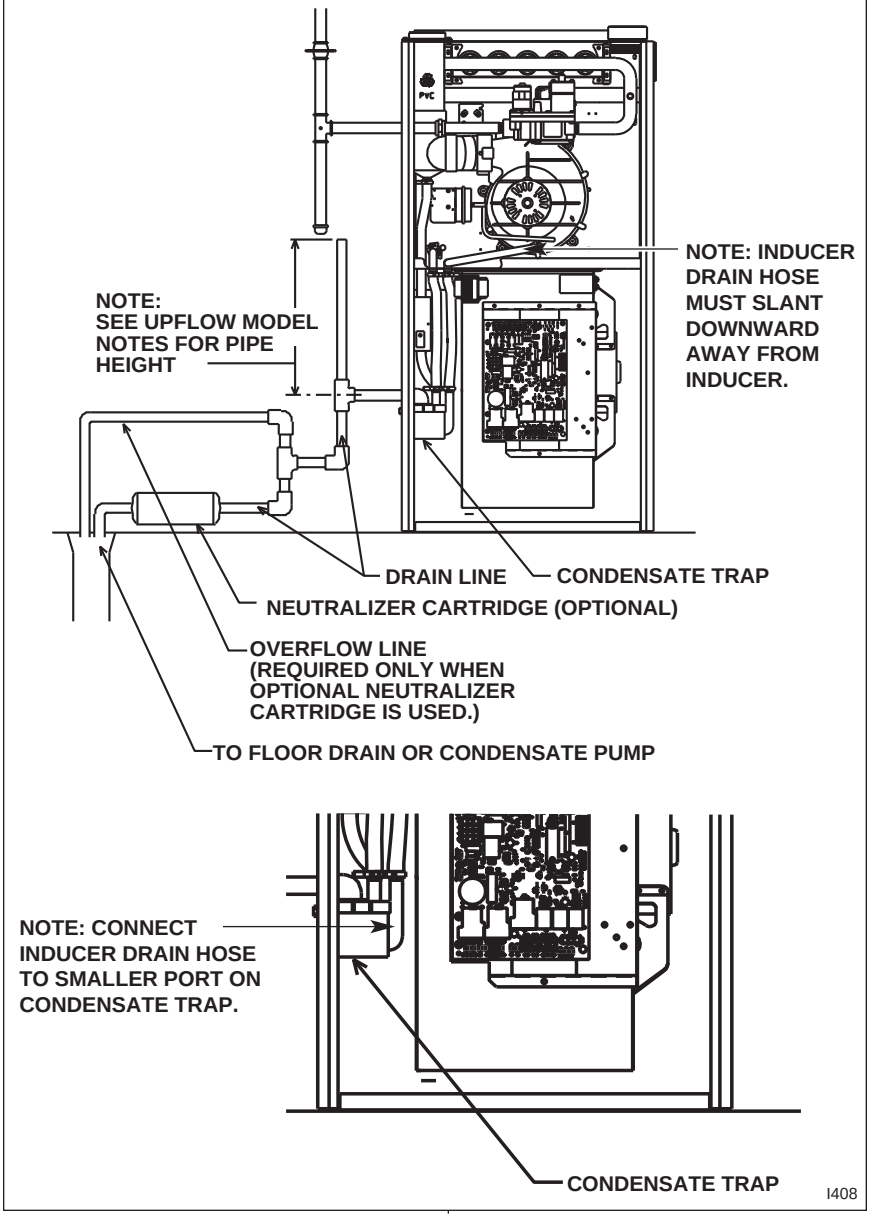
IMPORTANT: If installing the unit over a finished ceiling or living area, be certain to install an auxiliary condensate drain pan under the entire unit extending out under the condensate tee.

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.

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.

FIGURE 30
UPFLOW CONDENSATE DRAIN



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 1¾ 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 5½". 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 ½" 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 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.

FIGURE 31
UPFLOW OPPOSITE SIDE CONDENSATE TRAP CONNECTION

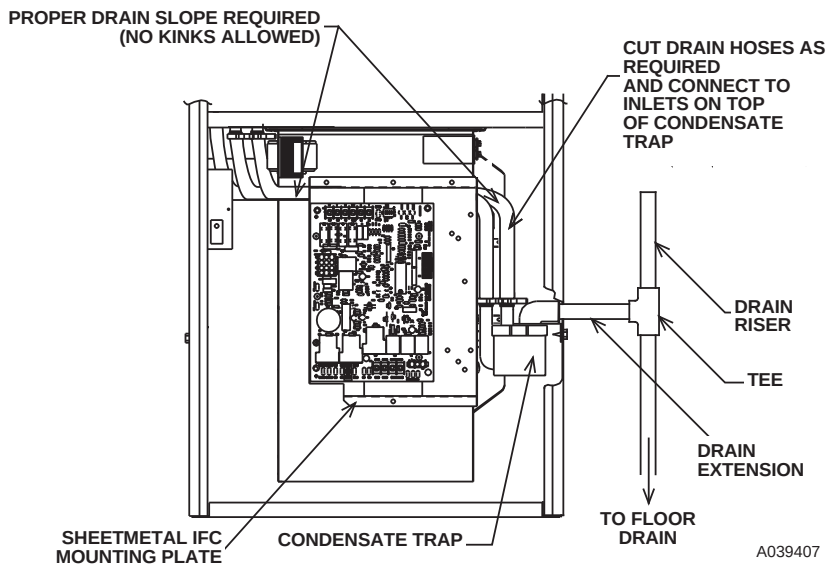
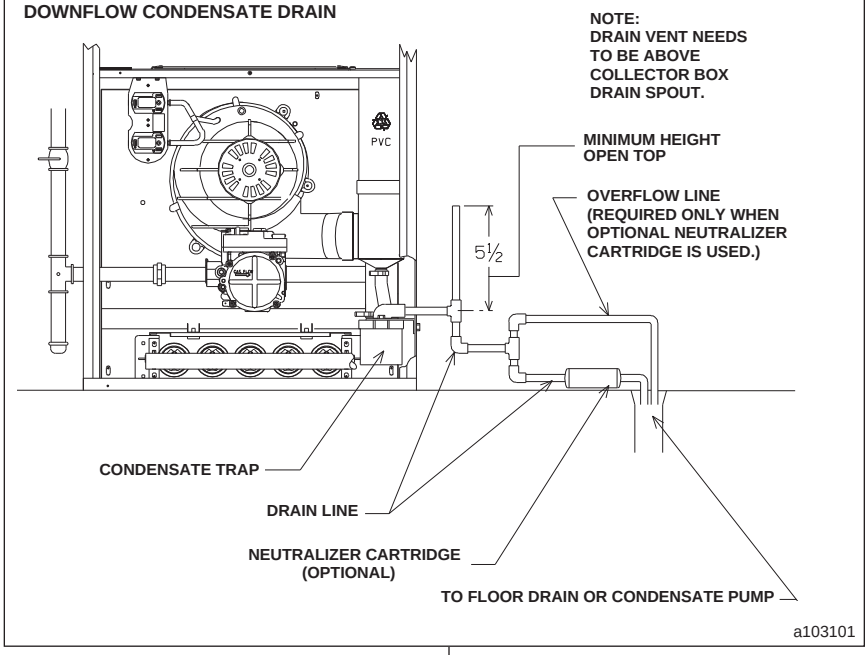


FIGURE 32
DOWNFLOW CONDENSATE DRAIN



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 collector box and horizontal drain trap.
4. Remove the double-elbow black molded hose Ⓓ from the exhaust transition Ⓔ. Discard this hose and the downflow 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:*

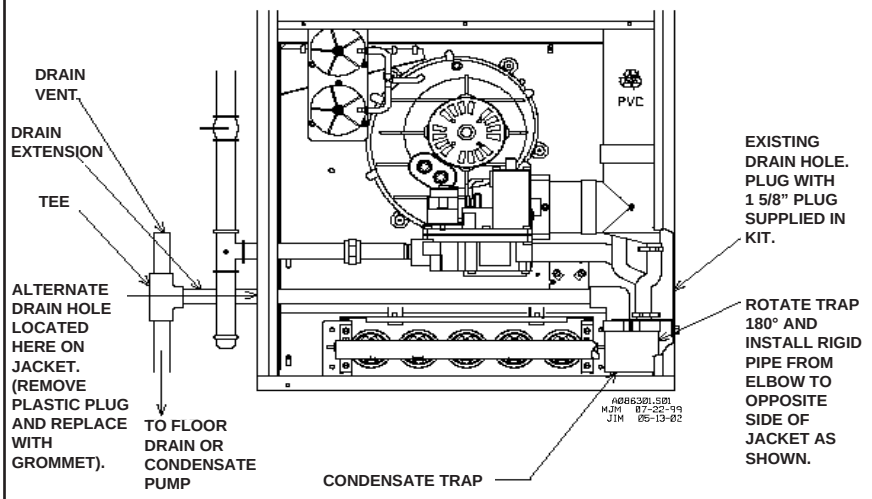
    CONDENSATE OVERFLOW: With a 1¾ inch riser installed above the tee, a blocked drain will result in overflow from the riser.

    FURNACE SHUTDOWN: To cause the furnace to shut down when a blocked drain is present, install a riser which is a minimum of 5½”. 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.

FIGURE 33
DOWNFLOW OPPOSITE SIDE CONDENSATE TRAP CONNECTION



FILLING THE TRAP

FILL THE TRAP ASSEMBLY WITH WATER BEFORE OPERATING THE FURNACE. Do this by removing the drain hose from the trap or from the connection to the secondary coil. Pour about a cup of water into the vent trap. Any excess water flows into the house drain when the trap is full.

NOTE: Fill the trap assembly with water every heating season.

CONDENSATE TRAP CONVERSION FROM DOWNFLOW TO HORIZONTAL INSTALLATION

FIGURE 34
UPRIGHT POSITION: REMOVAL OF EXISTING DOWNFLOW CONDENSATE TRAP

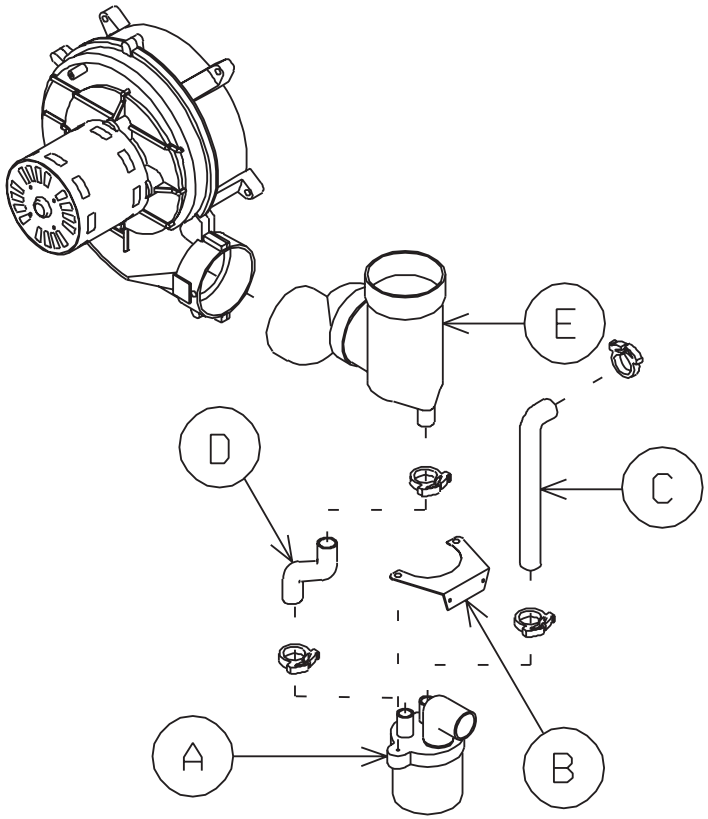
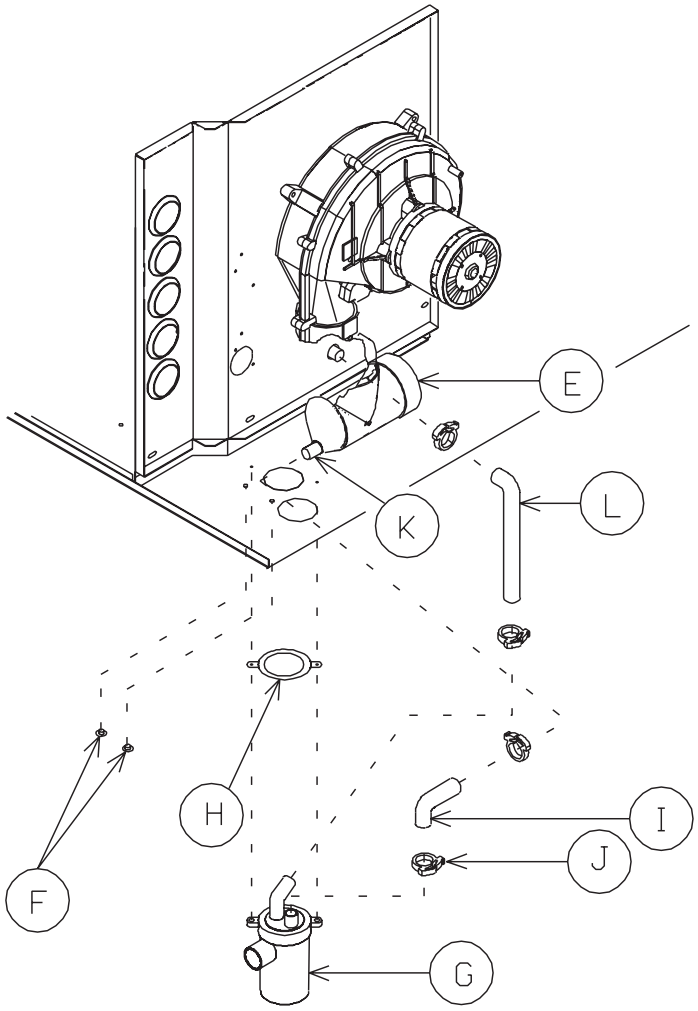


FIGURE 35
HORIZONTAL POSITION: CONDENSATE TRAP INSTALLATION FOR HORIZONTAL OPERATION



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.

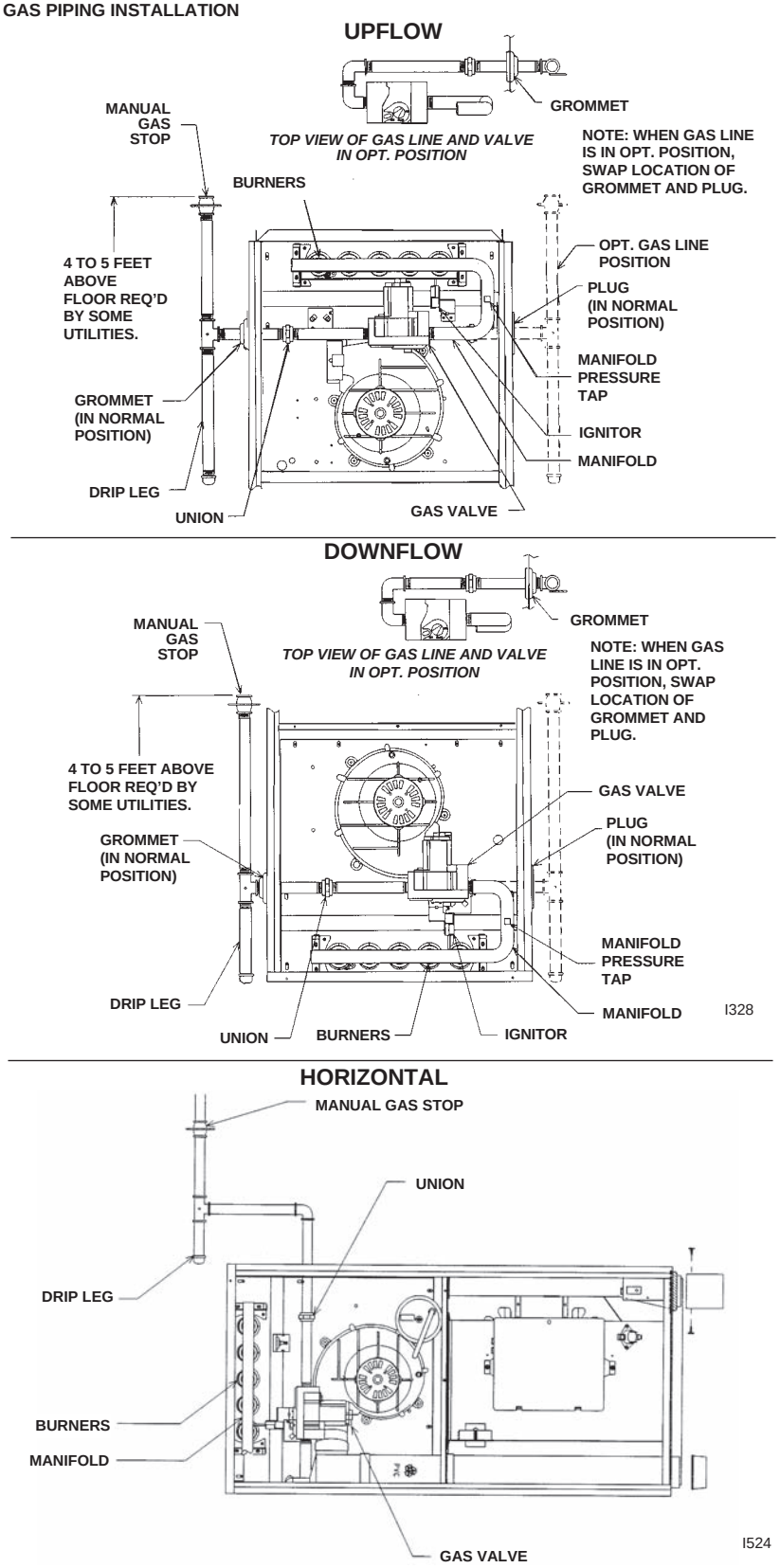
GAS PIPING

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

FIGURE 36
GAS PIPING INSTALLATION



IMPORTANT: 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).

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

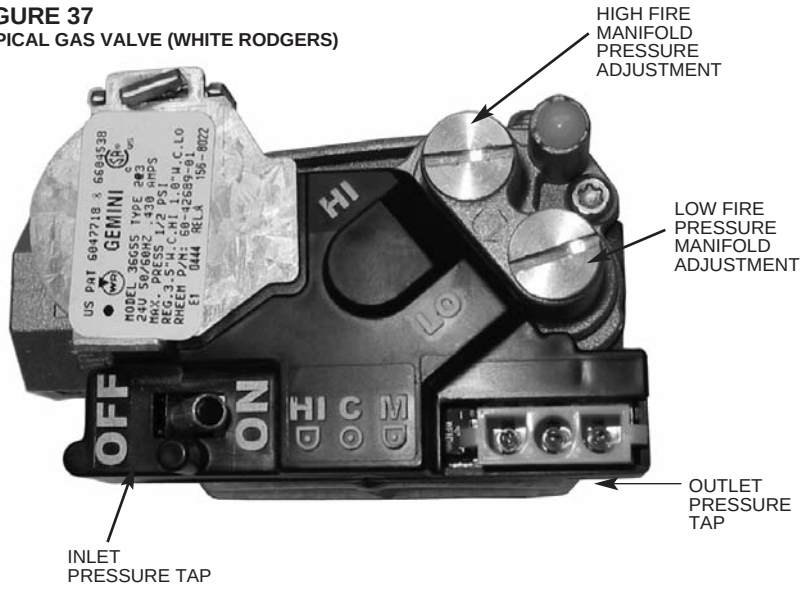
After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}^3\text{)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT^3) 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

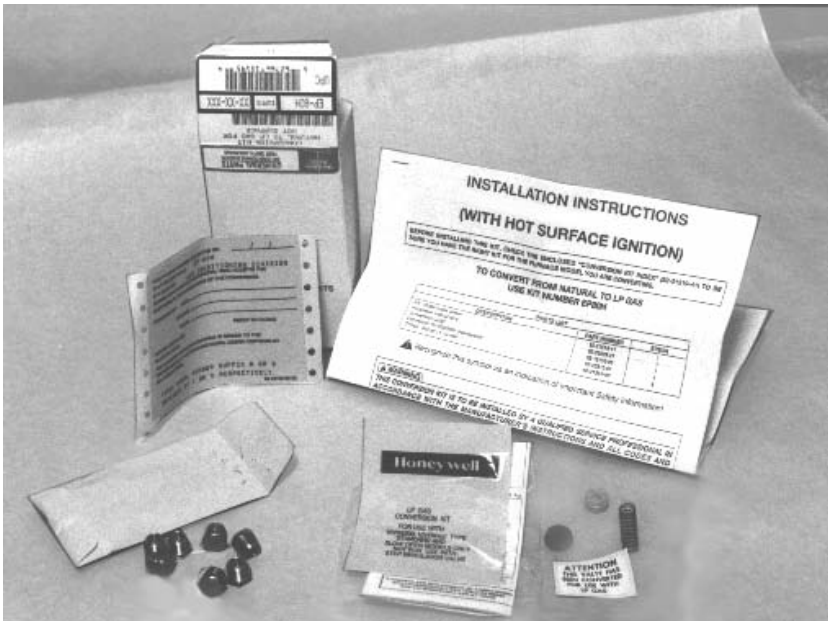
Refer to Table 9, page 46 for elevation and corresponding LP gas orifice size.

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.

FIGURE 38
TYPICAL LP KIT CONTENTS



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.

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)

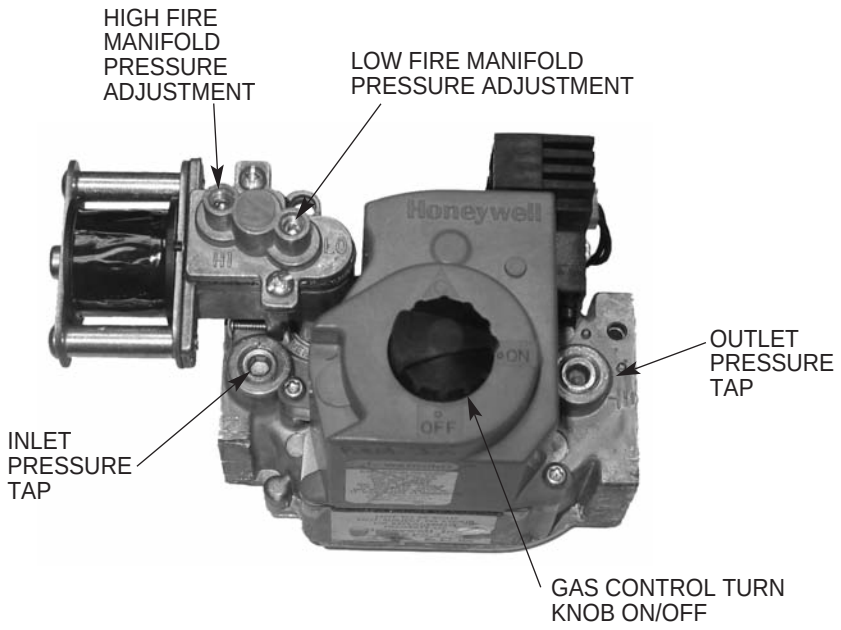
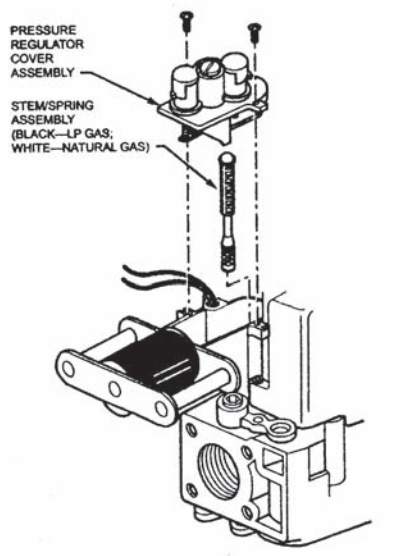


FIGURE 40



ELECTRICAL WIRING

⚠ WARNING

TURN OFF ELECTRIC POWER AT FUSE BOX OR SERVICE PANEL BEFORE MAKING ANY ELECTRICAL CONNECTIONS. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

NOTE: Electric to furnace must be supplied by commercial utility. Proper voltage is 110-125 volts.

⚠ WARNING

THE CABINET MUST HAVE AN UNINTERRUPTED GROUND ACCORDING TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, ANSI/ NFPA70- OR IN CANADA, THE CANADIAN ELECTRICAL CODE, CSA-C221 OR LOCAL CODES THAT APPLY. DO NOT USE GAS PIPING AS AN ELECTRICAL GROUND. A GROUND SCREW IS PROVIDED IN THE JUNCTION BOX. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

⚠ WARNING

THIS FURNACE IS EQUIPPED WITH A BLOWER DOOR SAFETY SWITCH. DO NOT DISABLE THIS SWITCH. FAILURE TO FOLLOW THIS WARNING CAN RESULT IN ELECTRICAL SHOCK, PERSONAL INJURY OR DEATH.

IMPORTANT: The furnace must be installed so that the electrical components are protected from water (condensate).

Before proceeding with the electrical connections, be certain that the voltage, frequency and phase corresponds to that specified on the furnace rating plate. For single furnace application, maximum over-current protection is 15 amperes.

Use a separate fused branch electrical circuit containing a properly sized fuse or circuit breaker. Route this circuit directly from the main switch box to an electrical disconnect that is readily 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

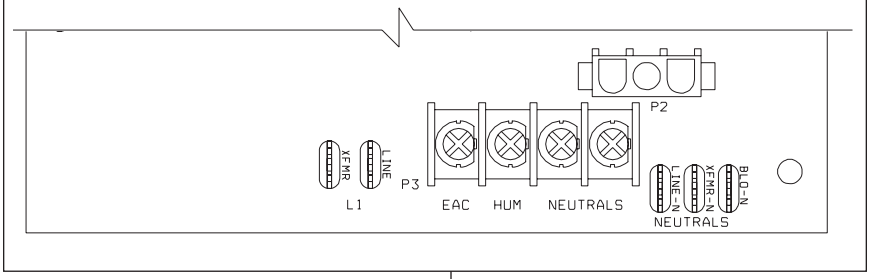
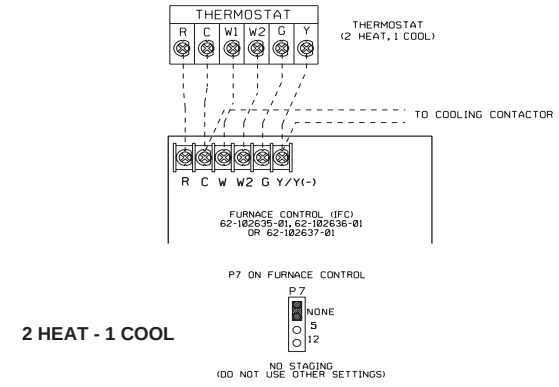
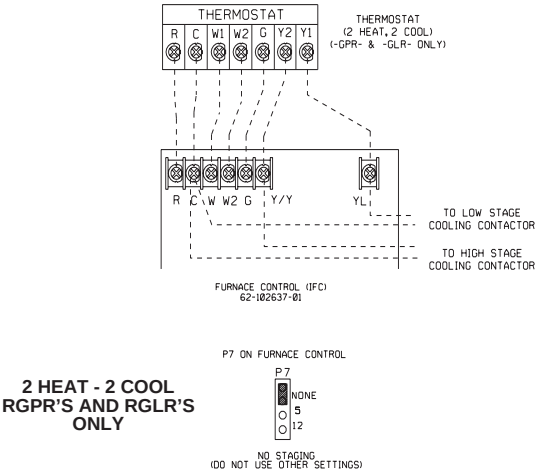


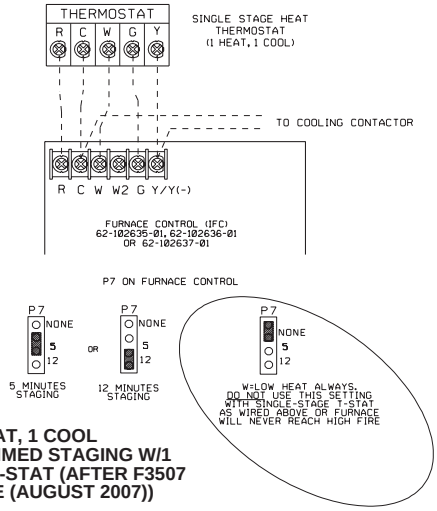
FIGURE 42
THERMOSTAT WIRING OPTIONS



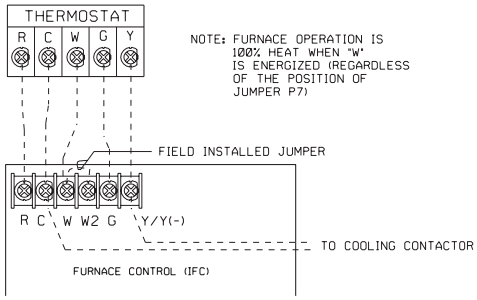
2 HEAT - 1 COOL



2 HEAT - 2 COOL
RGPR'S AND RGLR'S
ONLY



1 HEAT, 1 COOL
(OPTION A) TIMED STAGING W/1
STAGE HEAT T-STAT (AFTER F3507
DATE CODE (AUGUST 2007))



1 HEAT, 1 COOL
(OPTION B) 100% HEAT ALWAYS -- NO
TIMED STAGING

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.

FIELD-INSTALLED OPTIONAL ACCESSORIES

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 "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.

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.

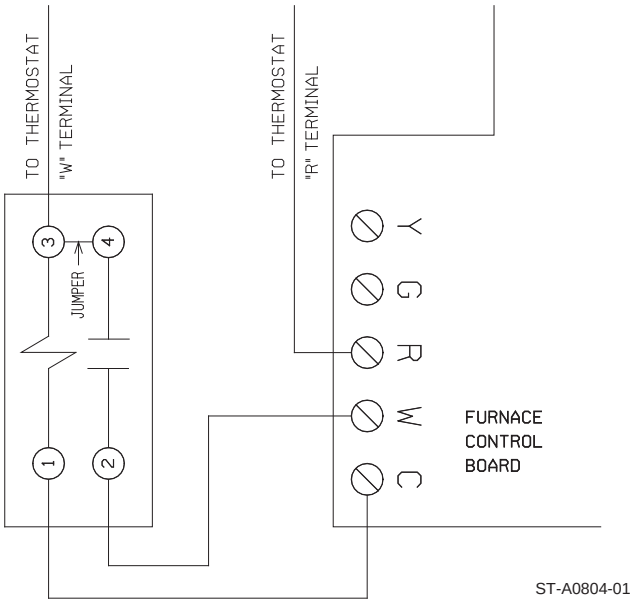
NOTE: Maximum current of 1.0 Amp for each option.

TABLE 6
FIELD WIRE SIZE FOR 24 VOLT CONTROL CIRCUITS

THERMOSTAT LOAD - AMPS	SOLID COPPER WIRE - AWG		
3.0	16	14	12
2.5	16	14	12
2.0	18	16	14
	50	100	150
	LENGTH OF RUN - FEET ①		

① Wire length equals twice the run distance
NOTE: Do not use 24 volt control wiring smaller than No. 18.

FIGURE 43
BASIC ISOLATION RELAY – SEE FIGURE 42 FOR DETAILS



90+ HIGH ALTITUDE INSTRUCTIONS

NATURAL GAS

⚠ CAUTION

INSTALLATION OF THIS FURNACE AT ALTITUDES ABOVE 2000 FT (610 m) SHALL BE IN ACCORDANCE WITH LOCAL CODES, OR IN THE ABSENCE OF LOCAL CODES, THE NATIONAL FUEL GAS CODE, ANSI Z223.1/NFPA 54 OR NATIONAL STANDARD OF CANADA, NATURAL GAS AND PROPANE INSTALLATION CODE, CAN B149.1.

INSTALLATION OF THIS APPLIANCE AT OR ABOVE 5000 FT (1525 m) SHALL BE MADE IN ACCORDANCE WITH THE LISTED HIGH ALTITUDE CONVERSION KIT AVAILABLE WITH THIS FURNACE.

⚠ 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. THE FOLLOWING EXAMPLES SHOW HOW TO DETERMINE IF AN ORIFICE CHANGE WILL BE NECESSARY AND HOW TO DETERMINE THE NEW ORIFICE SIZE.

IN CANADA, AS AN ALTERNATE TO SIZING THE BURNER ORIFICE, THE MANIFOLD GAS PRESSURE MAY BE ADJUSTED. THIS METHOD IS COVERED LATER IN THIS SECTION. THIS METHOD OF ADJUSTING MANIFOLD PRESSURE MAY ONLY BE USED IN CANADIAN INSTALLATIONS.

34" 90 Plus furnaces installed at high elevations require the installation of a high altitude kit for proper operation. The high altitude kit consists of a high altitude pressure switch that replaces the pressure switch attached to the induced draft blower.

HIGH ALTITUDE KIT

Installer must make necessary burner orifice and pressure switch changes as indicated in the table below:

(-)GRM PRESSURE SWITCH CHANGES

INPUT	HIGH ALTITUDE KIT NO.	SET POINT HIGH FIRE	SET POINT LOW FIRE
45,000	RXGY-F18	-1.08	NO CHANGE
60,000	RXGY-F18	-1.08	NO CHANGE
75,000 (N)	N/A	NO CHANGE	NO CHANGE
75,000 (W)	N/A	NO CHANGE	NO CHANGE
90,000	RXGY-F20	-1.15	NO CHANGE
105,000	RXGY-42	-1.08	-0.50
120,000	RXGY-F21	-0.50	-0.30

(-)GTM PRESSURE SWITCH CHANGES

INPUT	HIGH ALTITUDE KIT	HIGH FIRE	LOW FIRE
60,000	RXGY-F29	-1.0	-0.8
75,000 (N)	RXGY-F30	-0.8	-0.6
75,000 (W)	RXGY-F30	-0.8	-.06
90,000	RXGY-F31	-0.9	-.06
105,000	RXGY-F32	-0.7	-.04
120,000	RXGY-F33	-0.4	-0.3

NOTE: Orifices are no longer supplied with kit.

The pressure switch must be installed at elevations above 5000 ft. Elevations above 2000 ft. require the furnace to be de-rated 4% per thousand feet.

Alternately, furnaces can be ordered from the factory already converted for high altitude elevations. The factory option for high altitude elevations would be ordered as a 278 option (example; a 105k BTU upflow furnace which is factory converted for high altitude elevations would have the model number (-)GRM-1DEZAJS278). These factory converted furnaces come with a pressure switch for high-altitude elevations already attached. Also, different burner orifices are installed at the factory which are one drill size smaller (#51 DMS) than standard (-)GRM gas furnaces (#50 DMS). The smaller orifice is installed to accommodate for average heating values expected in most high altitude areas and a required 4% per thousand feet reduction in input as specified by the *National Fuel Gas Code* (NFGC). Specific orifices should <u>always</u> be recalculated for all

TABLE 7

Natural Gas Orifice Drill Size (4% per 1000 ft. De-Rate)
IMPORTANT: 90 Plus Models only. Do <u>not</u> use this chart for any 80 Plus Models.
Burner Input (per burner) 15,000 BTU @ Sea Level

Annual Avg. Heat Value (btu per ft³)	Sea level to 1999 ft	2000 to 2999 ft	3000 to 3999 ft	4000 to 4999 ft	5000 to 5999 ft	6000 to 5999 ft	7000 to 7999 ft	8000 to 8999 ft
850	47	48	48	49	49	49	50	50
900	48	49	49	49	50	50	50	51
1000	49	50	50	50	51	51	51	52
1075	50	51	51	51	51	52	52	52
1170	51	51	52	52	52	53	53	53

TABLE 8
SUPPLEMENTAL ORIFICE SIZE CHART

90 Plus ONLY models with 15,000 Btu's per Burner. DO NOT USE THIS CHART FOR ANY 80 PLUS MODEL.

NATURAL GAS QUICK REFERENCE CHART FOR ORIFICE SELECTION, AT 3.5" W.C. AND APPROXIMATE FINAL FIRING RATES											
Sea Level Orifice Size	Sea Level Cubic Foot at 3.5" W.C.	90 Plus Heat Value at 15,000 Btu's per Burner	ELEVATION CHART (NFG recommended orifice based on 4% derate for each 1000 foot of elevation, based on the intersection of the orifice required at Sea Level and the elevation required below)									
			0-999	1000-1999	2000-2999	3000-3999	4000-4999	5000-5999	6000-6999	7000-7999	8000-8999	9000-9999
46	18.57	808	46	46	47	47	47	48	48	49	49	50
47	17.52	856	47	47	48	48	49	49	49	50	50	51
48	16.36	917	48	48	49	49	49	50	50	50	51	51
49	15.2	987	49	49	50	50	50	51	51	51	52	52
50	13.92	1078	50	50	51	51	51	51	52	52	52	53
51	12.77	1175	51	51	51	52	52	52	52	53	53	53
Final Firing Rate per Burner			15,000	14,400	13,800	13,200	12,600	12,000	11,400	10,800	10,200	9,600

All calculations are performed by using the first three columns of information only. Before beginning any calculations, determine the individual burner Btu size and heating value at Sea Level for the installation site. Each value shown in the Heat Value column is per burner at 3.5" W.C.

NOTE:
Heat Value at Sea Level, for the location of the installation, is available from the Natural Gas Supplier to that site. Orifices for all altitudes are based on Sea Level values.

Divide the individual burner capacity (15,000 for 90 plus) by the Heat Value for the site to determine the Cubic Foot value at Sea Level, or divide burner capacity by the Cubic Foot value for the Heat Value. Once you have either the Cubic Foot Value or the Heat Value you can estimate the Sea Level orifice for the site. To select the corresponding high altitude orifice, locate the site elevation on the chart above and the orifice required at Sea Level from your calculation in the first column. The correct high altitude orifice that must be installed in each individual burner is the intersection of these two points on the chart above.

TABLE 9
IMPORTANT: 90+ MODELS ONLY. DO NOT USE THIS CHART FOR ANY 80 PLUS MODELS.
LP GAS ORIFICE DRILL SIZE (4% PER 1000 FT DE-RATE)

Altitude	Input (per burner) 15000	Orifice Size
0 to 2000 ft	15000	1.15 mm (factory)
2001 to 3000	13200	1.15 mm
3001 to 4000	12600	1.10 mm
4001 to 5000	12000	#58
5001 to 6000	11400	#59
6001 to 7000	10800	#60
7001 to 8000	10200	#62

high altitude installations as outlined below. Orifices should be changed, if necessary, based on gas heating value and elevation.

NOTE: Factory installed orifices are calculated and sized based on a sea level Natural Gas heating value of 1075 BTU per cubic ft. Regional reduced heating values may nullify the need to change orifices except at extreme altitudes.

The following are examples of orifice sizing using the National Fuel Gas Code Appendix F. For a simplified estimation of orifice size based on heating value and elevation, use Tables 8 and 7, however calculations are the best method.

Example: 900 BTU/ft³ Regional Natural Gas Heating Value

I / H = Q
15000 / 900 = 16.68 ft³/hr

I = Sea Level input (per burner): 15000
H = Sea Level Heating Value: 900
Q = 16.68 ft³ Natural Gas per hour.

From Table F.1 of *National Fuel Gas Code Handbook, 2002* (3.5" w.c. column)
Orifice required at Sea Level: #48

From Table F.4 of *National Fuel Gas Code Handbook, 2002*
Orifice required at 5000 ft. elevation (4% de-rate per thousand ft.): #50
Orifice required at 8000 ft. elevation (4% de-rate per thousand ft.): #51

Example: 1050 BTU/ft³ Regional Natural Gas Heating Value

I / H = Q
15000 / 1050 = 14.63 ft.³

I = Sea Level input (per burner): 15000
H = Sea Level Heating Value: 1050
Q = 14.28 ft.³ Natural Gas per hour.

From Table F.1 of *National Fuel Gas Code Handbook, 2002* (3.5" w.c. column)
Orifice required at Sea Level: #50
From Table F.4 of *National Fuel Gas Code Handbook, 2002*
Orifice required at 5000 ft. elevation (4% de-rate per thousand ft.): #51
Orifice required at 8000 ft. elevation (4% de-rate per thousand ft.): #52

LP GAS AT HIGH ALTITUDE ELEVATIONS

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

The NFGC guidelines are used with the following exception:

The recommended LP Gas high altitude orifice selections differ slightly in that the NFGC LP orifice chart, as they are not accurate for Rheem products. The National Fuel Gas Code LP orifices are based on an 11" of water column pressure at the orifice, which differs from Rheem products that use 10" of water column at the orifice. This difference requires a deviation from the NFGC orifice size recommendations. The Sea Level input should still be reduced by 4% per thousand ft. and the orifice size must be selected based on the reduced input selection shown in Table 9.

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):

Orifice Part Number 62-22175-(drill size)

Example 1:
#60 drill size orifice required
Part # 62-22175-60

Example 2:
1.15mm drill size orifice required
Part # 62-22175-91

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 10.

The information in Table 10 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 46 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 10
ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE
IMPORTANT: 90+ MODELS ONLY. DO NOT USE THIS CHART FOR ANY 80 PLUS MODELS.

NATURAL GAS

ALTITUDE	INPUT	OUTPUT	ORIFICE SIZE	MANIFOLD PRESSURE
0' - 2000'	45,000 60,000 75,000 90,000 105,000 120,000	40,500 54,000 67,500 81,000 94,500 108,000	#50	3.5" W.C.
2001' - 4500'	40,500 54,000 67,500 81,000 94,500 108,000	36,450 48,600 60,750 72,900 85,050 97,200	#51	3.0" W.C.

LP GAS

ALTITUDE	INPUT	OUTPUT	ORIFICE SIZE	MANIFOLD PRESSURE
0' - 2000'	45,000 60,000 75,000 90,000 105,000 120,000	40,500 54,000 67,500 81,000 94,500 108,000	1.15mm	10" W.C.
2001' - 4500'	40,500 54,000 67,500 81,000 94,500 108,000	36,450 48,600 60,750 72,900 85,050 97,200	1.10mm	7.6" W.C.

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.

LA PRESSION DU DISTRIBUTEUR D'ALIMENTATION DE CET APPAREIL A ÉTÉ AJUSTÉ SUR LES LIEUX AFIN D'OBTENIR LA BONNE PUISSANCE D'ENTRÉE POUR UNE INSTALLATION ENTRE 2000 ET 4500 PIEDS D'ALTITUDE. 92-24399-01-01

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 exchanger 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.

⚠ WARNING

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" and Figure 42 for a wiring diagram showing how to connect a thermostat.

SINGLE-STAGE HEAT THERMOSTAT

NOTE: Single-stage heat operation is determined by the position of the jumper at P7 on the control board. Options are: 5 minutes between 1st and 2nd stage, or 12 minutes between 1st and 2nd stage (see Figure 46).

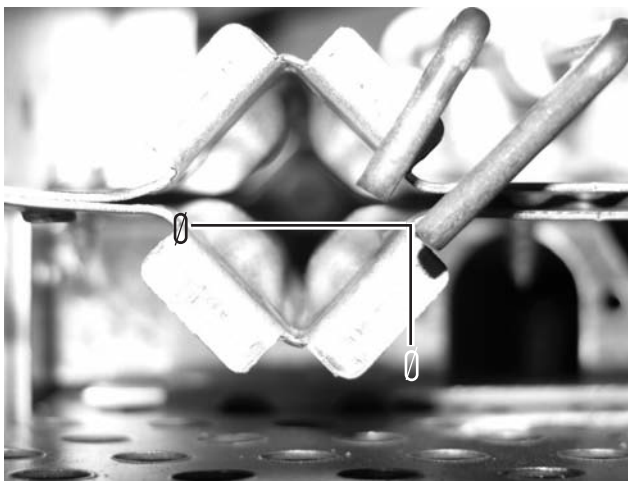
For single-stage operation, "W" from the thermostat must be connected to "W" on the furnace control.

Do not leave jumper at P7 in the "NONE" position when using a single-stage thermostat with the timed staging feature. If the jumper is left on "NONE", the furnace will never reach high heat (100% heat). **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, both ignition and steady state heat will occur at high fire and there will be no change in operation after ignition.

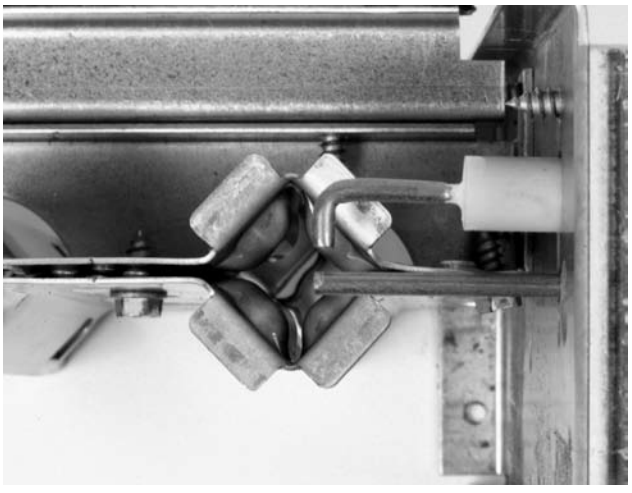
a. Connect the "W" terminal on the thermostat to the "W" terminal on the control board.
b. When there is a call for heat, the "R" and "W" contacts close and the IFC runs a self check routine to verify that the pressure switch contacts are open. The limit switch contacts are constantly monitored.
c. The induced draft motor starts on high speed. After a 30 second pre-purge, the spark ignitor energizes and the high fire gas valve opens, lighting the burners.
d. After the gas valve opens, the remote flame sensor must prove ignition for one second using the process of flame rectification. If the burners do not light, the system

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 47 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 attemps.
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 heat call at the thermostat or power 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 both the low and high 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 value 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 blower 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 low and high pressure switch contacts close. The gas valve switches to high fire and the main blower switches to high heat speed.

TABLE 11
DIP SWITCH BANK SW1

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

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 11.) (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

FIGURE 46

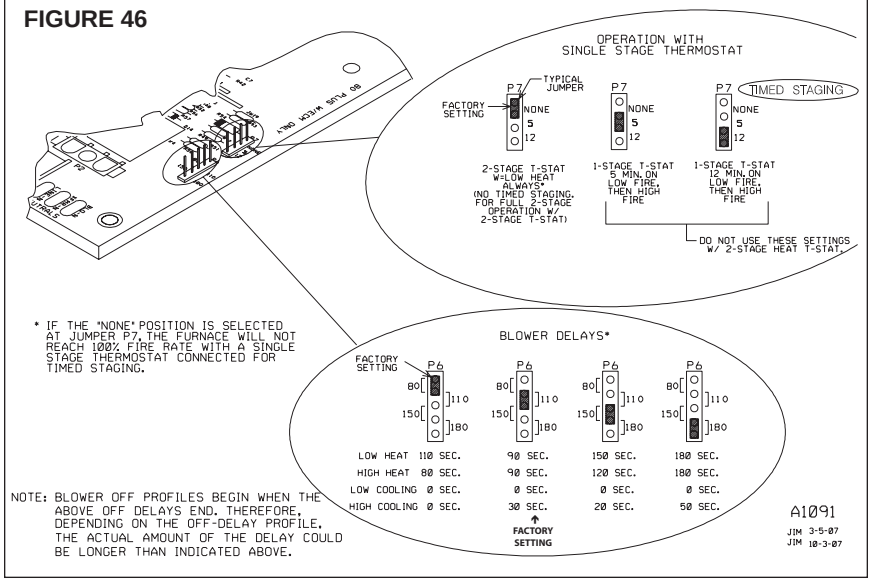


Figure 47: 2-Stage, 90+ ECM Dipswitch Map

IFC #62-103189-01 / UT 1095-206

DIPSWITCH MAP
*** = Factory Position**

5&6 = Cooling Select

SW1-5 / SW1-6	-05 -06 -07A	MODEL -07B	-09	-10	-12
OFF/OFF *	1200 HI/ 900 Low	1600 HI/ 1200 Low	1900 HI/ 1500 Low	1800 HI/ 1500 Low	2000 HI/ 1500 Low
ON/OFF	1000 HI/ 750 Low	1200 HI/ 900 Low	1600 HI/ 1200 Low	1600 HI/ 1200 Low	1600 HI/ 1200 Low
OFF/ON	800 HI/ 600 Low	1000 HI/ 750 Low	1400 HI/ 1050 Low	1400 HI/ 1050 Low	1400 HI/ 1050 Low
ON/ON	600 HI/ 450 Low	800 HI/ 600 Low	1200 HI/ 900 Low	1200 HI/ 900 Low	1200 HI/ 900 Low

9 = Cont Fan Speed

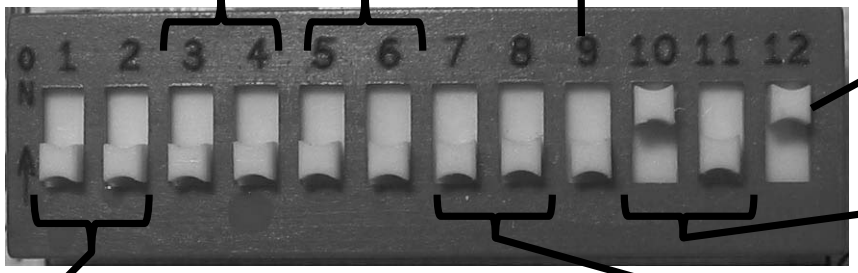
SW1-9 = ON, APPROX. CONTINUOUS FAN AIRFLOW

SW1-1	S1-W2	-GTM 06	07	09	10	-GRM 04	06	07-M	07-Y	09	-10	12
OFF*	OFF*	800	1100	1350	1450	850	750	750	1200	1300	1400	1250
ON	OFF	500	750	1000	1100	500	550	550	850	850	1050	950
OFF	ON	650	900	1200	1250	650	600	700	1000	1050	1150	1050
ON	ON	1050	1500	1750	1850	1150	850	900	1550	1600	1200	1450

SW1-9 = OFF*, Airflow = 60% of the above value.

3&4 Not Used

All Switches Shown in Factory Default Positions



12 = 1 or 2 Stg Cool

SW1-12	Description
ON *	1-Stage Cool
OFF	2-Stage Cool

10&11 = Dehumidification

SW1-10 / SW1-11	DEHUMIDIFICATION SELECTION
OFF/OFF	15% LESS COOLING AIRFLOW
ON/OFF *	NORMAL COOLING AIRFLOW
OFF/ON	ON-DEMAND DE-HUMIDIFICATION
ON/ON	NORMAL COOLING AIRFLOW

1&2 = Heat Rise Adjust

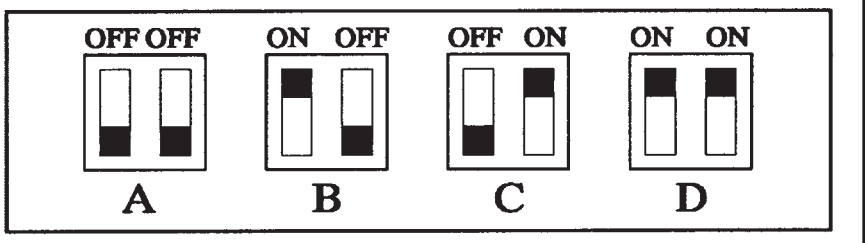
	Model	Published Low Temp Rise Range	Low Fire D-SW1-1, 2= ON/ON Approx. Temp Rise	A-SW1-1, 2= OFF/OFF* Approx. Temp Rise	C-SW1-1, 2= OFF/ON Approx. Temp Rise	B-SW1-1, 2= ON/OFF Approx. Temp Rise	Published Low Temp Rise Range	High Fire D-SW1-1, 2= ON/ON Approx. Temp Rise	A-SW1-1, 2= OFF/OFF* Approx. Temp Rise	C-SW1-1, 2= OFF/ON Approx. Temp Rise	B-SW1-1, 2= ON/OFF Approx. Temp Rise
UPFLOW	04(-)MCKS	15°-45°F	23°F	30°F	38°F	45°F	30°F-60°F	38°F	45°F	53°F	60°F
	06(-)MCKS	35°-65°F	43°F	50°F	58°F	65°F	40°-70°F	48°F	55°F	63°F	70°F
	07(-)MAES	35°-65°F	43°F	50°F	58°F	65°F	40°-70°F	48°F	55°F	63°F	70°F
	07(-)YBGS	20°-50°F	28°F	35°F	43°F	50°F	35°-65°F	43°F	50°F	58°F	65°F
	09(-)ZAJS	25°-55°F	33°F	40°F	48°F	55°F	35°-65°F	43°F	50°F	58°F	65°F
	10(-)ZAJS	30°-60°F	38°F	43°F	53°F	60°F	40°70°F	48°F	55°F	63°F	70°F
	12(-)RAHS	40°-70°F	48°F	55°F	63°F	70°F	50°-80°F	58°F	65°F	73°F	80°F
DOWNFLOW	06(-)MCKS	35°-65°F	38°F	43°F	54°F	60°F	40°-70°F	43°F	50°F	57°F	63°F
	07(-)YBGS	20°-50°F	33°F	40°F	47°F	55°F	35°-65°F	38°F	45°F	52°F	60°F
	09(-)ZAJS	25°-55°F	33°F	40°F	48°F	55°F	35°-65°F	38°F	45°F	52°F	60°F
	10(-)ZAJS	30°-60°F	38°F	45°F	53°F	60°F	40°-70°F	38°F	50°F	57°F	65°F

7&8 = Cooling Trim

SW1-7 / SW1-8	COOLING AIRFLOW TRIM
OFF/OFF *	NONE
ON/OFF	+10%
OFF/ON	-10%
ON/ON	NONE

TWO STAGE 90'S W/ECM (GRM'S & GTM'S)

FIGURE 48



& 4, 5 & 6, 7 & 8, and 10 & 11. The assignments of the switch pairs are shown in Table 11 and Figure 47.

HEATING AIRFLOW ADJUSTMENTS

The furnace is shipped with low and high fire heating airflows. 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 airflows of 1½, 2, 2½ and 3 tons in the RGRM-04*MAES, RGRM-06*MAES and RGRM-07*MAES and of 2½, 3, 3½, and 4 tons are available in the RGRM-07*YBGS units. Airflows of 3, 3½, 4 and 5 tons are available in the RGRM-09EZAJS, RGRM-10EZAJS, RGRM-12ERAJS units. See Table 16 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 Figure 47.

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. Failure to do this will mean that the air conditioner will never go into low stage.

2-Stage Cooling Systems = #12 OFF
1-Stage Cooling Systems = #12 ON
1-Stage Cooling using Low Cool = #12 OFF

ADDITIONAL COOLING SPEEDS FOR SINGLE-STAGE COOLING APPLICATIONS

In addition to the listed cooling airflows 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. Figure 47 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.

SW1-9 = ON, APPROX. CONTINUOUS FAN AIRFLOW

SW1-1	S1-W2	-GTM				-GRM						
		06	07	09	10	04	06	07-M	07-Y	09	-10	12
OFF*	OFF*	800	1100	1350	1450	850	750	750	1200	1300	1400	1250
ON	OFF	500	750	1000	1100	500	550	550	850	850	1050	950
OFF	ON	650	900	1200	1250	650	600	700	1000	1050	1150	1050
ON	ON	1050	1500	1750	1850	1150	850	900	1550	1600	1200	1450

SW1-9 = OFF*, Airflow = 60% of the above value.

TABLE 12
HEAT RISE ADJUSTMENTS

Profile	SW1-1 & SW1-2	Temperature Rise (°F)
A	OFF/OFF	Nominal Setting - See Figure 47
B	ON/OFF	Nominal +15°F
C	OFF/ON	Nominal +8°F
D	ON/ON	Nominal -8°F

SETTING BLOWER OFF TIMINGS FOR COOLING AND HEAT PUMP OPERATION

There is a jumper (P6) on the main furnace control board for setting blower off timings. (See Figure 46.)

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 adjust switches (7 & 8 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 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.

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 15%. 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 18), 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.

***IMPORTANT:** Only traditional humidistats will work with this feature. Dehumidistats **will not** work properly with this feature.*

ADJUSTING OR CHECKING FURNACE INPUT

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

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 air flow 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 air flow 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

THE MEASURED TEMPERATURE RISE SHOULD BE AS CLOSE TO THE MIDDLE OF THE STATED RANGE AS POSSIBLE. FOR EXAMPLE, IF THE RISE RANGE IS 40 TO 70 DEGREES, THE MOST IDEAL RISE WOULD BE 55 DEGREES (THE MIDDLE OF THE RISE RANGE). IN ALL APPLICATIONS, THE INSTALLER MUST ADJUST THE TEMPERATURE RISE TO THIS "MIDDLE" POINT AS CLOSELY AS POSSIBLE. ALSO, THE TEMPERATURE RISE SHOULD NEVER BE ABOVE OR FALL BELOW THE STATED RANGE. DOING SO COULD CAUSE DAMAGE TO THE HEAT EXCHANGER OR INTERMITTENT OPERATION WHICH COULD CAUSE INJURY OR DEATH AND WILL VOID THE MANUFACTURER'S WARRANTY FOR THIS PRODUCT.

FIGURE 49
TEMPERATURE RISE MEASUREMENT

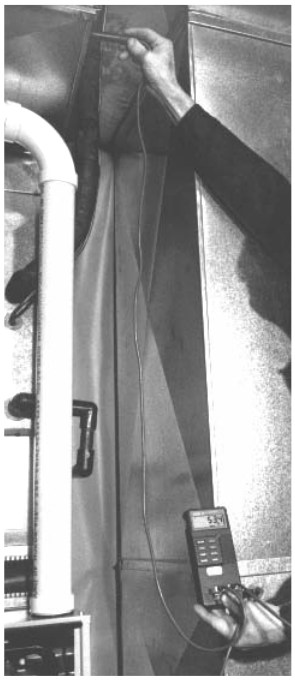


FIGURE 50
TYPICAL FURNACE NAME PLATE

AIR CONDITIONING DIVISION
FORT SMITH, ARKANSAS

CANADIAN ENERGY PERFORMANCE VERIFIED
RENDEMENT ENERGETIQUE VERIFIE

MODEL NO./NUMERO DE MODELE:
SERIAL NO./NUMERO DE SERIE: MFG. DATE

CATEGORY IV FORCED AIR FURNACE WHEN USING INDOOR AIR FOR COMBUSTION. CATEGORY IV TYPE FSP DIRECT VENT FORCED AIR FURNACE WHEN USING OUTDOOR AIR FOR COMBUSTION. FOR INDOOR INSTALLATION ONLY, IN A BUILDING CONSTRUCTED ON-SITE.
CATÉGORIE IV GÉNÉRATEUR D'AIR CHAUD À AIR FORCÉE LORSQUE DE L'AIR INTÉRIEUR EST EMPLOYÉ POUR LA COMBUSTION CATÉGORIE IV TYPE FSP ÉVACUATION DIRECTE GÉNÉRATEUR D'AIR CHAUD À AIR FORCÉE LORSQUE DE L'AIR EXTÉRIEUR EST EMPLOYÉ POUR LA COMBUSTION. POUR INSTALLATION À L'INTÉREIER SEULEMENT, DANS UN BATIMENT CONSTRUIT SUR LE SITE.

ELECTRIC 115 V. 60 HZ. 1 PH., MAXIMUM TOTAL INPUT 6.3 AMPS
ELECTRIQUE 115 V 60 HZ 1 PH, PUISSANCE D'ENTRÉE TOTALE MAXIMUM 6.3 A.
MAXIMUM OVERCURRENT PROTECTION 15 AMPERES. DISJONCTEUR À MAXIMA 15 A.

HOURLY INPUT RATING DEBIT CALORIFQUE MAXIMUM Btu/hr (Kw)	HOURLY INPUT RATING DEBIT CALORIFQUE MINIMUM Btu/hr (Kw)	FACTORY EQUIPPED FOR AGENCE A L'USINE POUR FOR GAS / GAZ
75000 (21 98)		NATURAL / NATUREL

**PLEASE REFER TO BOOKLET #92-101825-01 FOR INPUT CALCULATIONS
IN THE U S, AT ELEVATIONS ABOVE 2,000 FT. (610M), DERATE THE INPUT 4% PER 1,000 FT (305M) ABOVE SEA LEVEL
THIS APPLIANCE EQUIPPED FOR ALTITUDES / CET APPAREIL EST EQUIPÉ POUR ALTITUDES COMPRISES ENTIRE 0-2,000' / (0-610) FT.(M)/PIEDS(M)

	NATURAL GAS/ GAZ NATUREL	LP GAS OR PROP./ GAZ DE PÉTROLE LIQUÉFIÉ OU PROP.
ORIFICE / INJECTEUR 50 DMS		
LIMIT SETTING/LIMITE COUPE-CIRCUIT 190° (88°) °F(°C)		
AUXILIARY LIMIT SETTING/ LIMITE COUPE-CIRCUIT AUXILIAIRE °F(°C)	IN. W C.(kPa)/ PO C.E. (kPa)	IN. W.C.(kPa)/ PO C.E (kPa)
MAXIMUM PERMISSIBLE GAS SUPPLY PRESSURE TO FURNACE	10 5 (2 61)	13 0 (3.23)
PRESSION MAXIMUM D'ALIMENTATION EN GAZ À CHAUDIÈRE	10 5 (2 61)	13.0 (3.23)
MINIMUM GAS SUPPLY PRESSURE FOR PURPOSES OF INPUT ADJUSTMENT	5.0 (1 24)	11.0 (2.73)
PRESSION MINIMUM D'ALIMENTATION EN GAZ POUR LE RÈGLAGE DE PUISSANCE D'ENTRÉE	5.0 (1.24)	11 0 (2.73)
MANIFOLD PRESSURE / PRESSION A LA TUBULURE	3.5 (0 87)	10 0 (2.49)

AIR TEMPERATURE RISE/
AUGMENTATIONDE LA TEMPÉATUREDE L'AIR 45° (25°)– 75° (42°)° F (C°)

MAXIMUM EXTERNAL STATIC PRESSURE PRESSION STATIQUE EXTÉRIEURE MAXIMAL INCHES W C. (kPa)–PO C.E (kPa)		BLOWER/ SOUFFLEUR INCH (mm)/PO.(mm)	MOTOR FORCE HP (W)
.12	(.030)	11–7 (279–178)	1/2 (373)
.50	(.125)	11–7 (279–178)	1/2 (373)

ASSEMBLED IN THE USA 91-22176-09

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.

TABLE 13
FILTER SIZES

UPFLOW FILTER SIZES				
FURNACE WIDTH	INPUT MBTUH	BOTTOM SIZE	SIDE SIZE	QUANTITY
17 1/2"	45, 60, 75A	15 3/4" X 25"	15 3/4" X 25"	1
21"	75B, 90, 105	19 1/4" X 25"	15 3/4" X 25"	1
24 1/2"	120	22 3/4" X 25"	15 3/4" X 25"	1

DOWNFLOW/HORIZONTAL FILTER SIZES			
FURNACE WIDTH	INPUT MBTUH	SIZE	QUANTITY
17 1/2"	60, 75A	12" X 20"	2
21"	75B, 90, 105	12" X 20"	2
24 1/2"	120	14" X 20"	2

FIGURE 51
FILTER LOCATIONS

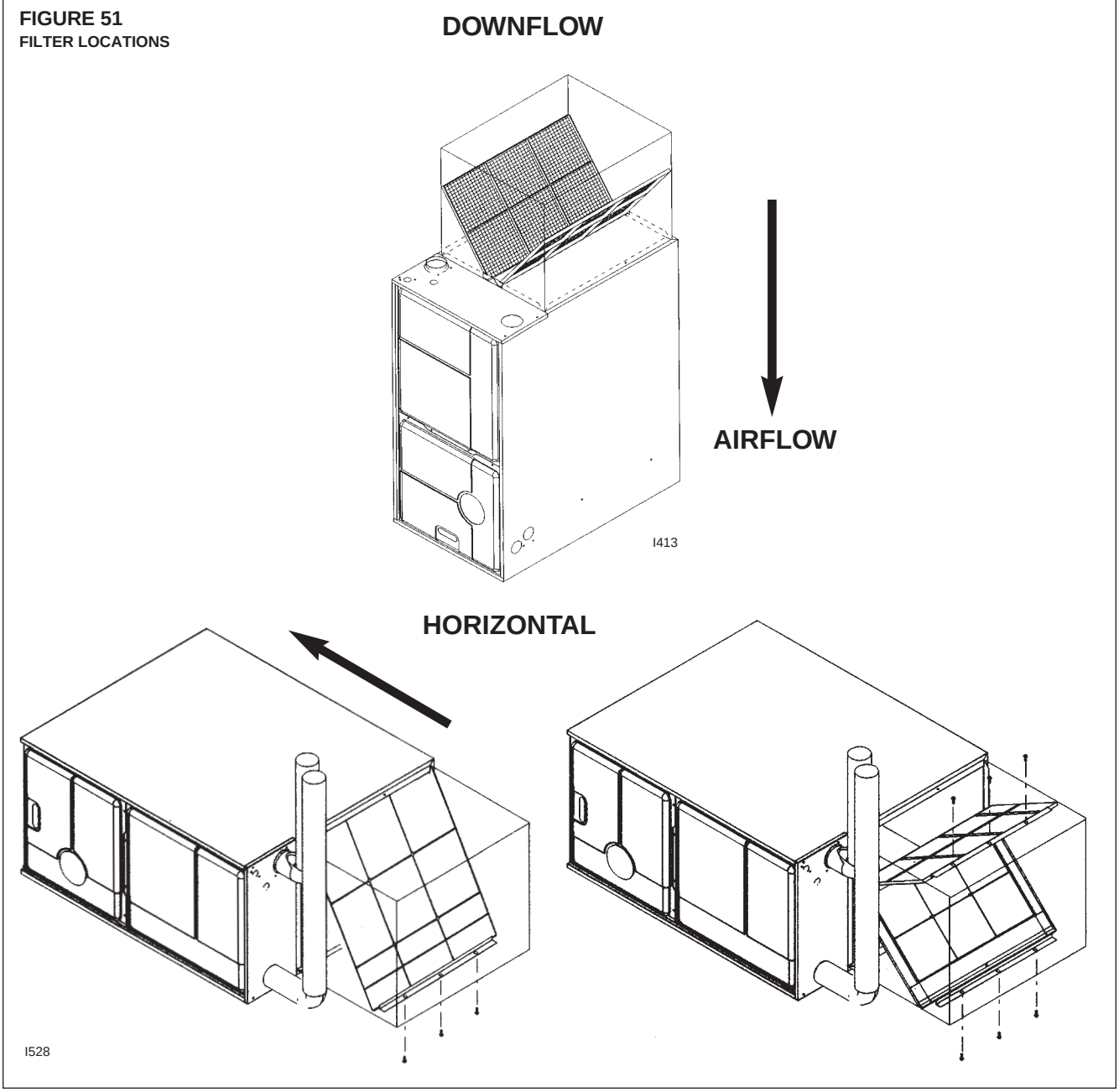
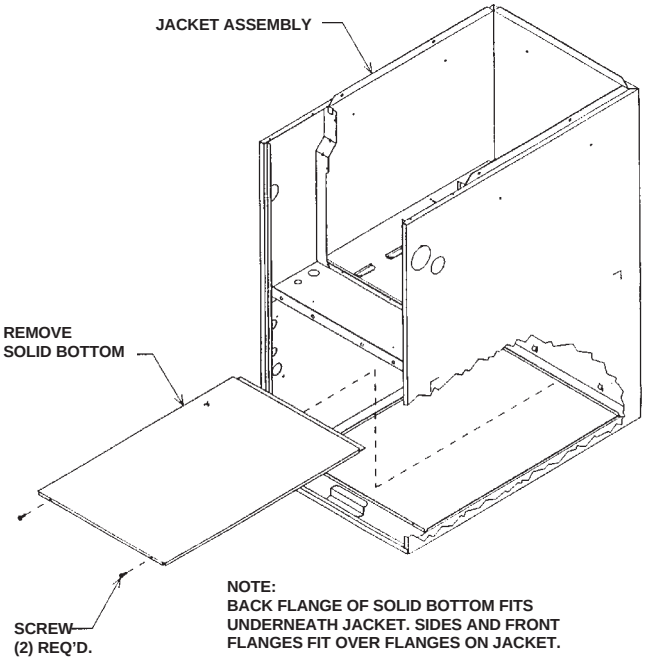
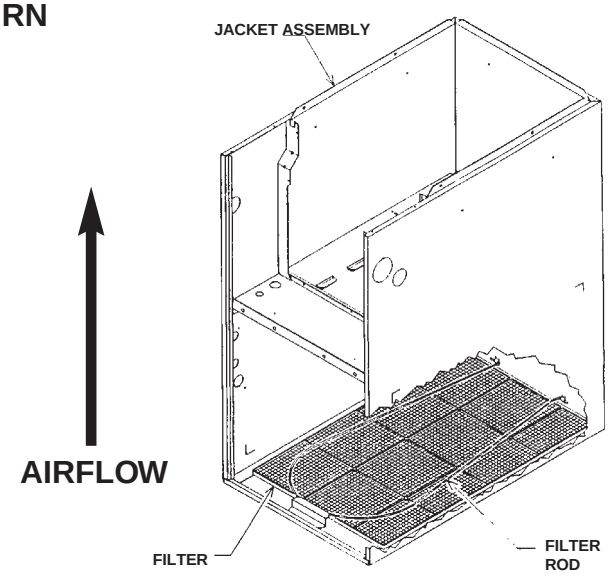


FIGURE 52
BOTTOM PANEL REMOVAL
FILTER LOCATION

UPFLOW BOTTOM RETURN



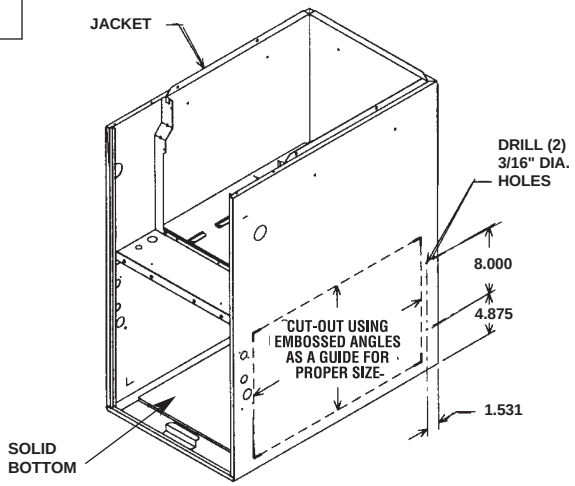
SOLID BOTTOM REMOVAL



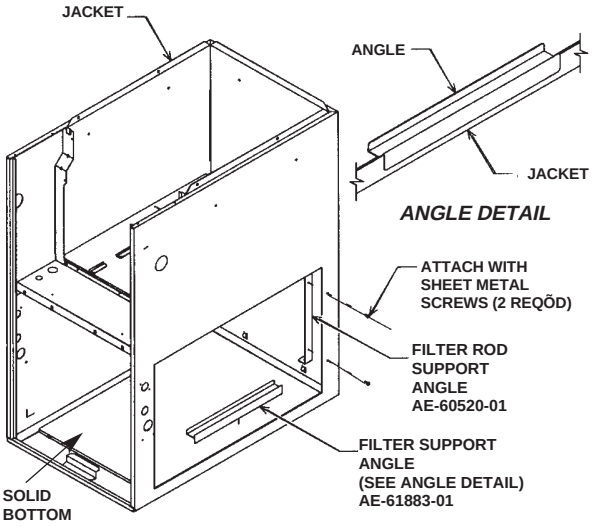
FILTER & ROD LOCATION

UPFLOW SIDE RETURN



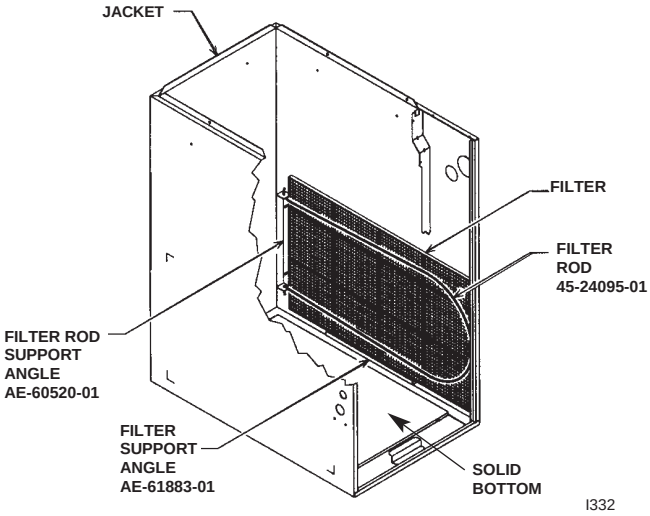


CUT-OUT AND DRILL DETAIL



ANGLE DETAIL

ROD & FILTER SUPPORT ANGLE ASSEMBLY



FILTER AND ROD ASSEMBLY

NOTE: Use both side returns for 1800 CFM or more.

⚠ 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 base. 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 impaired 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 17 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.

⚠ CAUTION

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, CARPETS 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 air flowing 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 and at approximately half way through 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 elevent 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 approximtely 1150 CFM. Because the resolution of this method is only 50 CFM (half-blinks), the actual taget 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.

FIGURE 53
TROUBLESHOOTING CHART

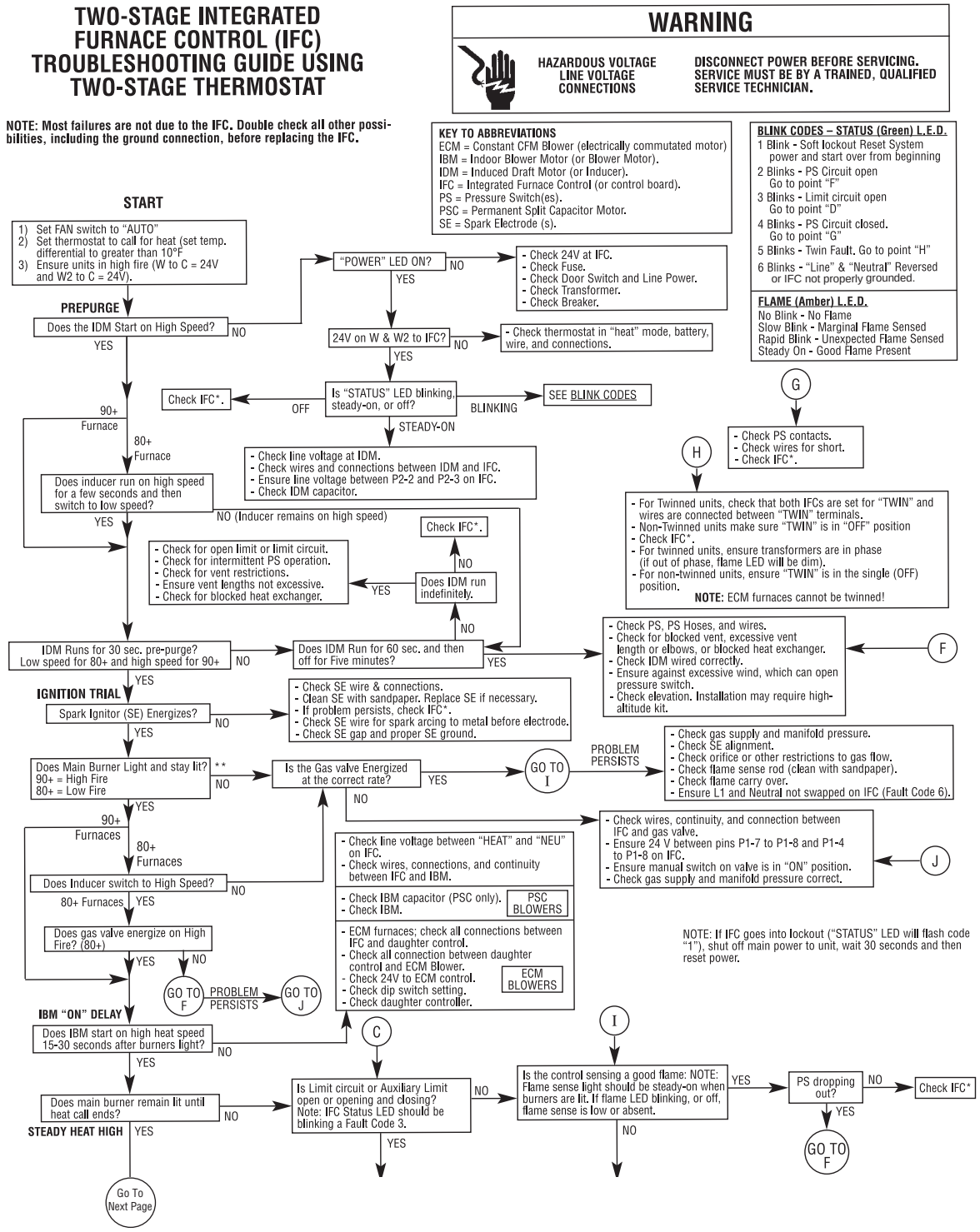
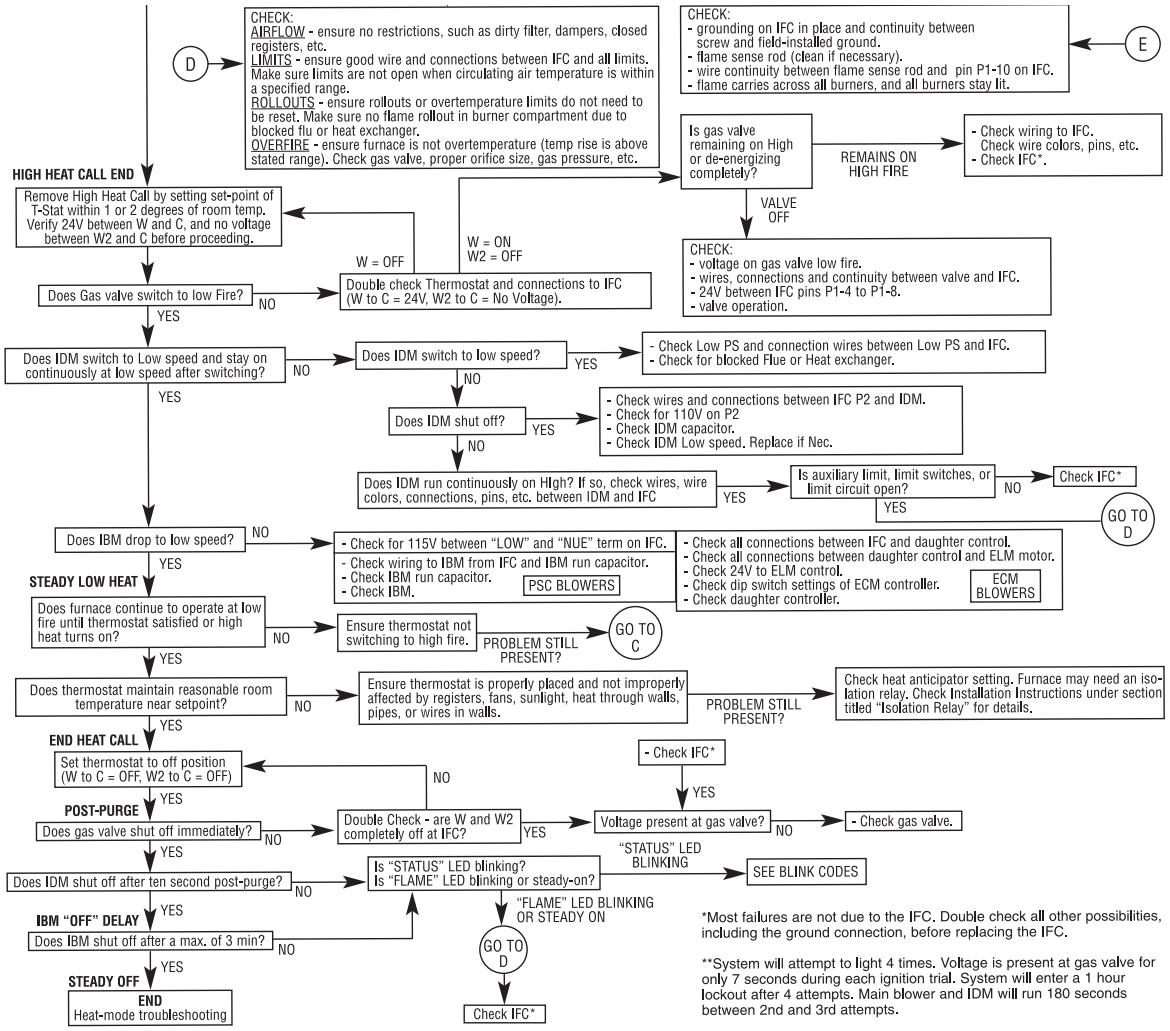


FIGURE 53
TROUBLESHOOTING CHART (CONTINUED)



REPEAT THIS PROCEDURE UNTIL TROUBLE-FREE OPERATION IS OBTAINED.

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FIGURE 54
WIRING DIAGRAM – RGRM (UPFLOW)

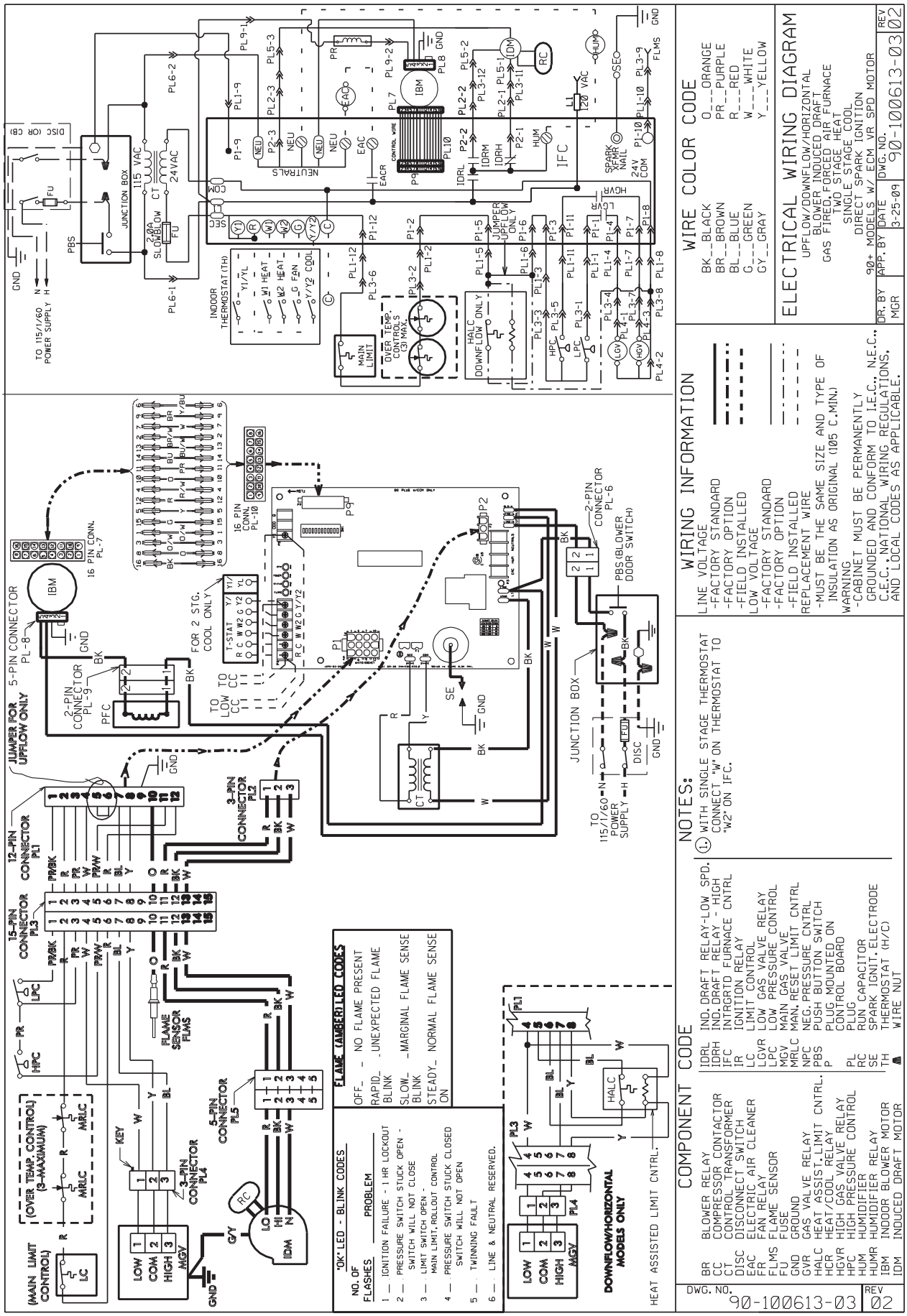


FIGURE 55
WIRING DIAGRAM – RGLM DOWNFLOW

