INSTALLATION INSTRUCTIONS
FOR 4 POSITION CONDENSING TWO-STAGE, COMMUNICATING GAS FURNACES W/ECM BLOWER
(-)96V SERIES & (-)(-)96MDV SERIES

U.L. and/or C.S.A. recognized fuel gas and CO (carbon monoxide) detectors are rec-
ommended in all applications, and their installation should be in accordance with the
manufacturer’s recommendations and/or local laws, rules, regulations, or customs.

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. and/or C.S.A. recognized fuel gas and CO (carbon monoxide) detectors are rec-
ommended in all applications, and their installation should be in accordance with the
manufacturer’s recommendations and/or local laws, rules, regulations, or customs.
— Improper installation, adjustment, alteration, service or maintenance can cause injury,
property damage or death. Refer to this manual. Installation and service must be
performed by a qualified installer, service agency or the gas supplier. In the
commonwealth of Massachusetts, installation must be performed by a licensed plumber
or gas fitter for appropriate fuel.

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.
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NOTE: A heat loss calculation should 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 to make sure that it is properly sealed. Proper airflow is necessary for both user comfort and equipment performance.

Before opening the furnace carton, verify that the data tags on the carton specify the furnace model number that was ordered from the distributor and are correct for the installation. If not, return the unit without opening the carton. If the model number is correct, open the carton and verify that the furnace rating label specifies the same furnace model number that is specified on the carton label. If the model numbers do not match, return the furnace to the distributor.

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 (-)96V and (-)(-)96MDV 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) or, for Canada, CSA B149.1; Canadian Natural Gas and Propane Installation Code 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
   5060 Spectrum Way
   Mississauga, Ontario
   Canada L4W5N6
   Online: www.csa.ca

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ST-A1205-01
In Canada installations must comply with CSA B149.1. Install units in Canada in accordance with CSA-B149, local installation codes and authorities having jurisdiction. CSA-B149.1 is available from:

CSA INTERNATIONAL
5060 Spectrum Way
Mississauga, Ontario
Canada L4W 5N6
online: www.csa.ca

NOTICE: Any equipment immersed in water (including by flooding) must be replaced. Equipment and products immersed in water will have operation adversely affected thereby voiding the warranty.

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 to be sure equipment matches job specifications.
- Read the entire instructions before starting the installation.
- Install the unit in such a way as to allow necessary access for service.
- Always remove the solid metal base pan from the top of the furnace. The base pan is installed in this location for shipping purposes only and should never remain in the as-shipped location after installation.
- Install the unit with a 1/4” to 1/2” forward slope (toward front) to ensure proper drainage.
- Install the unit in accordance with any local code which may apply and the national codes. Latest editions are available from: “National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269.” These publications are:
  - NFPA90A Installation of Air Conditioning and Ventilating Systems.
  - NFPA90B Installation of warm air heating and air conditioning systems.
  - In Canada CSA 22.2 Canadian Electrical Code.
  - In Canada CSA B149.1; Canadian Natural Gas and Propane Installation Code.

CALIFORNIA RESIDENTS ONLY

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.
Installation Checklist

REFER TO INSTALLATION INSTRUCTIONS

GAS SUPPLY

_____ Correct pipe size (record size)
_____ Correct supply pressure (during furnace operation)
     (record pressure)
_____ Manifold pressure (record upstream pressure)
_____ No gas leaks
_____ L.P. Kit Number (if applicable) (record kit number)

ELECTRICAL

_____ 115 V.A.C. supply (Dedicated Circuit)
     (record voltage)
_____ Polarity observed
_____ Furnace properly grounded
_____ Correct wire size (record type and gauge)

FURNACE INSTALLATION

_____ Correct clearance to combustibles (record clearance)
_____ Correct clearance for service (at front) (record clearance)

DUCT STATIC PRESSURE

_____ in. w.c. on heating speed (record static pressure)
_____ in. w.c. on cooling speed (record static pressure)
_____ Air temperature rise in heat (record air temperature rise)
_____ Air temperature rise in cool (record 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 (record diameter)
_____ in. diameter – exhaust pipe (record diameter)
_____ ft. of pipe – intake air (record length)
_____ no. of elbows – intake air (record number of elbows)

VENTING – NON-DIRECT VENT

_____ ft. of pipe – exhaust pipe (record length)
_____ no. of elbows – exhaust pipe (record number of elbows)
_____ Exhaust Vent Temperature (record temperature)

TERMINATIONS – DIRECT VENT

VERTICAL

_____ Intake – 12" [305mm] min. above roof/snow level
     (record height above anticipated snow level)
_____ Exhaust sloped down toward furnace
_____ Correct distances (horizontal and vertical) –
     exhaust to intake

HORIZONTAL/VERTICAL – CONCENTRIC (RXGY-E03A)

_____ Intake – 12" [305mm] min. above roof/snow level
     (record height above anticipated snow level)
_____ Exhaust sloped down toward furnace
_____ Correct relationships – exhaust to intake

_____ 12" [305mm] min. above grade/snow level (record
     height above anticipated snow level or, in
     Canada, intake and exhaust vents conform
     with CSA B149.1; Canadian Natural Gas and
     Propane Installation Code

TERMINATION – NON-DIRECT VENT

VERTICAL

_____ 12" [305mm] min. above roof/snow level (record
     height above anticipated snow level) or, in
     Canada, intake and exhaust vents conform
     with CSA B149.1; Canadian Natural Gas and
     Propane Installation Code

HORIZONTAL – STANDARD

_____ 12" [305mm] min. above grade/snow level (record
     height above anticipated snow level) or, in
     Canada, intake and exhaust vents conform
     with CSA B149.1; Canadian Natural Gas and
     Propane Installation Code
SAFETY 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
INSTALL THIS FURNACE ONLY IN A LOCATION AND PO-
SITION AS SPECIFIED IN THE LOCATION REQUIRE-
MENTS AND CONSIDERATIONS SECTION OF THESE
INSTRUCTIONS.

⚠️ WARNING
IMPROPER INSTALLATION, OR INSTALLATION NOT
MADE IN ACCORDANCE WITH THE CSA INTERNATIONAL
(CSA) CERTIFICATION OR THESE INSTRUCTIONS, CAN
RESULT IN UNSATISFACTORY OPERATION AND/OR DAN-
GEROUS CONDITIONS AND ARE NOT COVERED BY THE
MANUFACTURER’S WARRANTY.

⚠️ WARNING
DO NOT BYPASS, JUMPER, OR REMOVE ANY SAFETY
SWITCH FROM THE FURNACE CONTROL CIRCUIT. IF A
SAFETY SWITCH CAUSES THE FURNACE TO SHUT
DOWN OR OPERATE INTERMITTENTLY, IT IS AN INDICA-
TION OF A POTENTIAL SAFETY HAZARD THAT MUST BE
ADDRESSED BY A QUALIFIED TECHNICIAN, SERVICE
AGENCY OR THE GAS SUPPLIER. DO NOT RESET
SAFETY CONTROLS WITHOUT CORRECTIVE ACTION
AND/OR VERIFICATION OF PROPER SAFE OPERATION
BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE
GAS SUPPLIER.

Replace any safety control component only
with identical OEM replacement parts. When a
new safety control is installed, it must be
tested for a minimum of 15 minutes with the
furnace operating at maximum input rate and
with both blower and burner door installed.
If the furnace is installed in a closet, the
closet door must also be closed for this
test. Repeat the test at the minimum input rate
if the furnace is a multi-stage furnace.

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

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

⚠️ WARNING
COMBUSTION AND VENTILATION AIR MUST BE PRO-
VIDED TO THE FURNACE AS REQUIRED BY THE NA-
TIONAL FUEL-GAS CODE (U.S.) AND CSA B149.1
(CANADA) AND THE COMBUSTION AND VENTILATION
AIR SECTION OF THESE INSTRUCTIONS.

⚠️ WARNING
COMBUSTION PRODUCTS MUST BE DISCHARGED OUT-
DOORS. CONNECT THIS FURNACE TO AN APPROVED
VENT SYSTEM ONLY, AS SPECIFIED IN THE VENT PIPE
INSTALLATION SECTION OF THESE INSTRUCTIONS.

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

⚠️ WARNING
WHENEVER THE FACTORY RETURN-AIR CONNECTION
IS NOT USED IT MUST BE SEALED. A SOLID METAL
BASE PLATE MUST BE INSTALLED AND SEALED. FAC-
TORY BASE PLATES ARE AVAILABLE AS ACCESSORY
ITEMS. (PART NUMBERS ARE LISTED IN THE SPEC
SHEET FOR THE FURNACE.) FAILURE TO INSTALL AND
SEAL THE BASE PLATE AND RETURN AIR DUCT CON-
NECTIONS MAY ALLOW CARBON MONOXIDE AND
OTHER CONTAMINANTS TO BE DRAWN INTO THE CON-
DITIONED AIR SPACE AND DISTRIBUTED THROUGHOUT
THE HEATED SPACE.

⚠️ 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 PAR-
TICLES WILL BE HEATED AND CHARRED BY CONTACT
WITH THE FURNACE HEAT EXCHANGER. THIS SOOTY
RESIDUE WILL SOIL CEILINGS, WALLS, DRAPES, CAR-
PETS AND OTHER HOUSEHOLD ARTICLES. SOOT DAM-
AGE MAY ALSO RESULT WITH, OR WITHOUT, FILTERS IN
PLACE. WHEN CERTAIN TYPES OF CANDLES ARE
BURNED, OR CANDLEWICKS ARE LEFT UNTRIMMED.

⚠️ WARNING
IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RE-
COMMENDED THAT AN AUXILIARY DRAIN PAN BE IN-
STALLED UNDER THIS FURNACE AND ANY INSTALLED
EVAPORATOR COIL THAT IS 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 FURNACE CONDENSATE DISPOSAL
SYSTEM OR THE COIL DRAIN PAN OR A STOPPAGE IN
THE PRIMARY CONDENSATE DRAIN PIPING.
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.

SAFETY

**WARNING**

ALWAYS INSTALL THE 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 THE DUCTING SECTION OF THESE INSTRUCTIONS. SEE ALSO FURNACE RATING PLATE.

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 THERMOSTAT CONTROL;
- RETURN AIR DUCT SEALED TO THE FURNACE;
- AIR FILTERS IN PLACE;
- SET FURNACE INPUT RATE AND TEMPERATURE RISE PER RATING PLATE MARKINGS;
- 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 THAT THE FURNACE OPERATING CONDITIONS INCLUDING IGNITION, INPUT RATE, TEMPERATURE RISE AND VENTING, ACCORDING TO THE INSTRUCTIONS AND CODES.

**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 2).

- 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 2**

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).
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.
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, 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.

   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:** Furnace must be installed level from front-to-back or with a slight tilt such that the back of the furnace is up to 1/2” higher than the front of the furnace as shown in Figure 3.

**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.

**FREEZE PROTECTION**

For installations where the furnace may reach temperatures below 32°F (0°C) (such as an alcove or attic installation), the installer must take precautions to ensure that the drain trap and connected drain pipe do not freeze. Local codes and practices should be followed in order to prevent freezing.

If the drain trap is installed within the furnace cabinet, no freeze protection is required. When the trap is mounted outside or partially outside the cabinet, it must be protected from freezing. Regardless of the location of the drain trap, any exposed drain piping must be protected from freezing as required by local practices or codes. A UL or CSA listed heat tape or UL or CSA approved heating cable with a rating of 3-6 watts per foot is acceptable protection when installed and maintained in accordance with the manufacturer’s instructions. Good installation practices necessitate that the installer verify heat tape operation in accordance with the manufacturer's instructions at the time of installation.

**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.
LOCATION REQUIREMENTS

GENERAL INFORMATION (cont.)

WARNING
THIS FURNACE IS NOT APPROVED OR RECOMMENDED FOR INSTALLATION ON ITS BACK, WITH ACCESS DOORS FACING UPWARDS.

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 Figure 6.

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 Figure 6 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 (30 cm) is recommended in front of all furnaces.

NOTE: Use recommended 24" (30 cm) clearance if accessibility clearances are greater than fire protection clearances.

For downflow non-zero clearance furnace installations, the minimum clearance required on the right side of the furnace is shown in Figure 4. If this clearance cannot be maintained, a downflow zero-clearance kit; RXGY-ZK will need to be installed.

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.
**FIGURE 6**  
UNIT DIMENSIONS (CLEARANCE TO COMBUSTIBLES)

<table>
<thead>
<tr>
<th>MODEL</th>
<th>LEFT SIDE</th>
<th>RIGHT SIDE</th>
<th>BACK</th>
<th>TOP</th>
<th>FRONT</th>
<th>VENT</th>
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<tbody>
<tr>
<td></td>
<td>MINIMUM CLEARANCE (IN.)</td>
<td>MINIMUM CLEARANCE (IN.)</td>
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<tr>
<td>4-VWMA</td>
<td>0 0 0 1 2 0</td>
<td>0 0 0 1 2 0</td>
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<tr>
<td>4-VWML</td>
<td>0 0 0 1 2 0</td>
<td>0 0 0 1 2 0</td>
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<td></td>
<td></td>
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<tr>
<td>4-VWMB</td>
<td>0 0 0 1 2 0</td>
<td>0 0 0 1 2 0</td>
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<td></td>
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<tr>
<td>4-VWML</td>
<td>0 0 0 1 2 0</td>
<td>0 0 0 1 2 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: A service clearance of at least 24" is recommended in front of all furnaces.*

**FLANGE DIMENSIONS**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>17.12</td>
<td>20.66</td>
<td>23.00</td>
</tr>
<tr>
<td>20.00</td>
<td>23.00</td>
<td>26.00</td>
</tr>
</tbody>
</table>

**Option**

- **Optional Trap Location (Horizontal)**
- **Optional Condensate Drain (Downflow)**
- **Optional Combustion Air Inlet**
- **Optional Condensate Drain (Upflow)**
- **Optional Condensate Inlet**
- **Optional Line Voltage Wiring**

**Note:** Flange configuration will vary depending on installation orientation.
GENERAL CONVERSION INSTRUCTIONS

CONDENSATE PVC/HOSE OPTIONS

CONDENSATE DRAIN COUPLING
CONDENSATE DRAINAGE HAS OPTIONS FOR 3/4" OR 1/2" PVC CONNECTIONS. THE CONDENSATE DRAIN COUPLING CONNECTS THE RUBBER HOSES FROM INSIDE THE UNIT TO THE PVC PIPE EXTERIOR OF THE UNIT. PVC PIPE CAN BE CEMENTED DIRECTLY TO THE COUPLING AND THE TRAP WITH PROPER PVC CEMENT AND PRIMER.

CONDENSATE TRAP
IN ADDITION TO PVC CONNECTIONS, THE CONDENSATE TRAP CAN ACCOMODATE A 5/8" RUBBER HOSE WITH A HOSE CLAMP WHEN LOCATED INSIDE THE UNIT.

THE CONDENSATE TRAP HAS 2 SIDES PLEASE NOTE THEIR LOCATIONS FOR DRAIN CONNECTIONS DURING CONVERSION.

NOTE: IMPROPER HOSE CONNECTIONS WILL PREVENT CONDENSATE FROM DRAINING AND MAY DAMAGE FURNACE.

CONVERSION AND INSTALLATION CONSIDERATIONS

ALL CONVERSIONS REQUIRE THE CONDENSATE PLUMBING TO HAVE DECLINE IN THE DIRECTION OF THE WATER FLOW.

WHEN INSTALLING AND MOVING CONDENSATE PLUMBING THE HOSES SHOULD BE FREE OF KINKS FOR PROPER WATER FLOW.

WHEN DRAIN HOSE OR CONDENSATE TRAP HOSE ROUTING CHANGES ARE NECESSARY BE sure TO PLUG OR CAP ANY UNUSED HOSE TAPS.

THE INDUCER COUPLING COMES FROM THE FACTORY WITH A 10° TILT FOR UP FLOW INSTALLATIONS. WHEN CONVERTED TO DOWN FLOW THE COUPLING REQUIRES A ROTATION A MINIMUM OF 10° FROM HORIZONTAL AS SHOWN.

HORIZONTAL INSTALLATIONS REQUIRE CONDENSATE TRAP TO BE MOUNTED EXTERNALLY BELOW THE UNIT:
-USE CAUTION: MOUNT THE TRAP AFTER THE UNIT IS AT THE POINT OF INSTALLATION TO PREVENT DAMAGE TO THE TRAP DURING TRANSPORT.

-HAND TIGHTEN SCREWS WHEN MOUNTING THE TRAP OR THE CONDENSATE DRAIN COUPLING TO THE CABINET TO PREVENT DAMAGE TO THE MOUNTING FLANGE.

-USE PROPER FREEZE PROTECTION IF REQUIRED.

-ALLOW MINIMUM OF 6" BELOW THE FURNACE FOR CLEARANCE.

THE WORM DRIVE FOR THE HOSE CLAMPS USED ON THE FLUE TRANSITION COUPLING OR THE IDB COUPLING MUST BE ABOVE THE LEVEL MIDLINE WHEN IN THE HORIZONTAL POSITION AS DETAILED HERE.

NOTE:
IF THE IDB COUPLING IS REMOVED, IT MUST BE REPLACED IN THE PROPER ORIENTATION. AN ARROW IS PRESENT ON THE COUPLING TO INDICATE THE DIRECTION OF EXHAUST FLOW. MAKE SURE THE ARROW POINTS IN THE CORRECT DIRECTION.
GENERAL PARTS REQUIRED FOR CONVERSIONS

SEE PAGE 14 FOR DETAILS ON KIT APPLICATIONS

### PARTS BAG (PROVIDED WITH UNIT)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td>Intake Coupling</td>
<td>(X2)</td>
</tr>
<tr>
<td>Intake Air Diffuser</td>
<td>(X2)</td>
</tr>
<tr>
<td>Condensate Drain Coupling</td>
<td>(X2)</td>
</tr>
<tr>
<td>Hose Clamp</td>
<td>(X2)</td>
</tr>
<tr>
<td>1/4&quot; Hole Plug</td>
<td></td>
</tr>
<tr>
<td>#8 X 1/2&quot; Screw</td>
<td></td>
</tr>
<tr>
<td>2&quot; PVC Vane</td>
<td></td>
</tr>
<tr>
<td>Alternate Drain Assembly</td>
<td></td>
</tr>
</tbody>
</table>

### CONVERSION KIT RXGY-CK

- 2" Pipe Grommet (Ø 3.375)
- #8 X 1/2" Screw
- .559" Condensate Trap Drain Plug
- 1/2" Vinyl Cap (Yellow)
- 2-5/8" Flush Mount Plug
- 5/8" Drain Hose B
- 1/2" Drain Hose E
- 1/4" Black Vent Tube
- Condensate Trap Bracket (Down Flow)
- Condensate Trap Gasket
- 1/2" Drain Hose F

### CONVERSION KIT RXGY-ZK

- #8 X 1/2" Screw
- Pipe Collar Gasket Assembly
- 1/2" Drain Hose G
- Intake Pipe
- Flue Pipe Assembly W/ O-Ring

SEE NEXT PAGE FOR APPLICABLE CONFIGURATIONS
FIELD CONVERSIONS

FIELD CONVERSION TO VARIOUS CONFIGURATIONS

Furnaces can be converted in the field from upflow (as-shipped) to downflow, horizontal left or horizontal right as necessary. In addition, there are different venting options, including a zero-clearance option, to give the installer flexibility in locating the venting for this furnace.

LISTS OF MATERIALS FOR PARTS BAGS AND CONVERSION KITS ................................................................. Pg 12
GENERAL CONVERSION INSTRUCTIONS AND TIPS .................................................................................... Pg 13

UPFLOW WITH VERTICAL VENT ................................................................. Pg 15-16

UPFLOW WITH LEFT SIDE VENT  
(REQUIRES CONVERSION KIT RXGY-CK) ................................................................. Pg 17-18

DOWNFLOW WITH RIGHT VENT (NON-ZERO CLEARANCE)  
(REQUIRES CONVERSION KIT RXGY-CK) ................................................................. Pg 19-22

DOWNFLOW ZERO-CLEARANCE  
(REQUIRES CONVERSION KIT RXGY-CK AND ZERO-CLEARANCE KIT RXGY-ZK) ................................................................. Pg 23-27

HORIZONTAL RIGHT WITH RIGHT VENT  
(REQUIRES CONVERSION KIT RXGY-CK) ................................................................. Pg 28-30

HORIZONTAL RIGHT WITH VERTICAL VENT  
(REQUIRES CONVERSION KIT RXGY-CK) ................................................................. Pg 31-33

HORIZONTAL LEFT WITH RIGHT VENT  
(REQUIRES CONVERSION KIT RXGY-CK AND ZERO-CLEARANCE KIT RXGY-ZK) ................................................................. Pg 34-38

HORIZONTAL LEFT WITH LEFT VENT  
(REQUIRES CONVERSION KIT RXGY-CK) ................................................................. Pg 39-41
**UPFLOW VERTICAL VENT**

**PARTS NEEDED:**
- Parts needed for this conversion require items from the Parts Bag only. No other conversion kits are needed.

**TOOLS/MATERIALS NEEDED:**
- Electric Drill
- 1/8" Drill Bit
- Pliers
- 1/4" Hex Head Driver
- Tube Cutter

**NOTE:** These conversion instructions are intentionally generic, some parts may be different in your furnace.

---

2 **OPTION DRAIN LEFT**

- **DRILL 1/8"**
- Determine right or left drain option.
- Locate 7/8" hole in jacket side.
- Remove plug - discard.
- Drill (2) 0 1/8" holes for the Condensate drain coupling.

---

3 **OPTION DRAIN RIGHT**

- **7/8" PLUG DISCARD**
- **DRILL 1/8"**
- Install condensate drain coupling using (2) screws. Install in jacket with the barbed fitting pointed into the vestibule.

---

4A

- **LEFT SIDE DRAIN OPTION**
- Attach hose A (pre-installed) to condensate drain coupling. Install hose clamp on hose over condensate drain coupling.
- **NOTE:** Use soapy water to facilitate easy hose and tube assembly.

---

4B

- **TUBE C CUT TO FIT CABINET WIDTH**
- **4b1**
- **4b2**
- **4b4**
- **HOSE A**
- **TUBE C**
- **(X2)**
- **4b - RIGHT SIDE DRAIN OPTION**
- **4b1 - CUT TUBE C TO FIT CORRESPONDING CABINET WIDTH**
- **4b2 - INSTALL TUBE C WITH HOSE CLAMP AS SHOWN TO HOSE A (PRE-INSTALLED)**
- **4b3 - ATTACH TUBE C ASSEMBLY TO CONDENSATE DRAIN COUPLING AS SHOWN**
- **4b4 - INSTALL HOSE CLAMP OVER HOSE ON CONDENSATE DRAIN COUPLING**
- **NOTE:** Use soapy water to facilitate easy hose and tube assembly

---

ST-A1194-28-X0
Checklist:

- Verify all hoses are secure and fully seated.
- Confirm that all hoses are free of kinks.
- Confirm all hoses and other drain parts have a slope in direction of water flow.
- All clamps and couplings are tightened.
- All drain ports are plugged.
- Unit has forward pitch.
- Heat tape installed (if required).

Notes:
UPFLOW LEFT VENT

PARTS NEEDED:

FROM PARTS BAG (PROVIDED W/UNIT)
INTAKE COUPLING W/ NUT
CONDENSATE DRAIN COUPLING (X2)
#8 X 1/2" SCREW (X2)
TUBE CLAMP

FROM CONVERSION KIT RXGY-CK
2-5/8" FLUSH MOUNT PLUG
2-3/8" PIPE GROMMET

TOOLS/MATERIALS NEEDED:

ELECTRIC DRILL
1/8" DRILL BIT
PLIERS
5/16 HEX HEAD DRIVER
FLAT HEAD SCREWDRIVER
1/4" HEX HEAD DRIVER
TUBING CUTTER

NOTE: THESE CONVERSION INSTRUCTIONS ARE INTENTIONALLY GENERIC, SOME PARTS MAY BE DIFFERENT IN YOUR FURNACE

1a - REMOVE FLUE TRANSITION, TRANSITION COUPLING, AND ELBOW. (NOTE: REMOVE INDUCER COUPLING WIELBOW FOR EASIER REMOVAL)
1b - REMOVE 3-3/8" FLUSH MOUNT PLUG FROM JACKET - DISCARD
1c - RELOCATE 2-3/8" FLUSH MOUNT PLUG FROM JACKET TO TOP PLATE

2a - INSTALL 2-5/8" FLUSH MOUNT PLUG IN TOP PLATE
2b - INSTALL 2" PIPE GROMMET AS SHOWN
2c - INSTALL INTAKE COUPLING AS SHOWN

3
OPTION DRAIN LEFT
SEE CRITICAL HOSE CLAMP LOCATION NOTE IN THE GENERAL COVERSION INSTRUCTIONS.

Determine right or left drain option.
Locate 7/8" hole in jacket side.
Remove plug - discard.
Drill (2) 1/8" holes for the condensate drain coupling.

4
OPTION DRAIN RIGHT
INSTALL CONDENSATE DRAIN COUPLING USING (2) SCREWS.
INSTALL IN JACKET WITH THE BARBED FITTING POINTED INTO THE VESTIBULE.

ST-A1194-29-01
NOTE:
USE SOAPY WATER TO FACILITATE EASY HOSE AND TUBE ASSEMBLY

5a - LEFT SIDE DRAIN OPTION
ATTACH HOSE A (PRE-INSTALLED) TO CONDENSATE DRAIN COUPLING. PLACE CLAMP OVER HOSE ON CONDENSATE DRAIN COUPLING.

5b - RIGHT SIDE DRAIN OPTION
5b1 - CUT TUBE C TO FIT CORRESPONDING CABINET WIDTH.
5b2 - INSTALL TUBE C WITH HOSE CLAMP AS SHOWN TO HOSE A (PRE-INSTALLED).
5b3 - ATTACH TUBE C ASSEMBLY TO CONDENSATE DRAIN COUPLING AS SHOWN.
5b4 - INSTALL HOSE CLAMP OVER HOSE ON CONDENSATE DRAIN COUPLING.

Checklist:

___ VERIFY ALL HOSES ARE SECURE AND FULLY SEATED.
___ CONFIRM THAT ALL HOSES ARE FREE OF KINKS.
___ CONFIRM ALL HOSES AND OTHER DRAIN PARTS HAVE A SLOPE IN DIRECTION OF WATER FLOW
___ BOTH WORM DRIVES ON THE HOSE CLAMPS OF THE ID8 COUPLING MUST BE LOCATED ON THE TOP OF THE COUPLING. SEE LOCATION DETAIL IN THE GENERAL CONVERSION INSTRUCTIONS AT THE BEGINNING OF THIS SECTION.
___ ALL CLAMPS AND COUPLINGS ARE TIGHTENED
___ ALL DRAIN PORTS ARE PLUGGED
___ UNIT HAS FORWARD PITCH
___ HEAT TAPE INSTALLED (IF REQUIRED)

Notes:
DOWNFLOW W/ RIGHT VENT (NON-ZERO CLEARANCE)

PARTS NEEDED:
FROM PARTS BAG (PROVIDED WITH UNIT)
(X2) #8 X 1/2” SCREW
(X2) HOSE CLAMP
ALTERNATE DRAIN ASSEMBLY TUBE C
INTAKE AIR DIFFUSER
INTAKE COUPLING W/ NUT
CONDENSATE DRAIN COUPLING
FROM CONVERSION KIT RXGY-CK
(X4) #8 X 1/2” SCREW
2” PIPE GROMMET Ø 3.375
2-5/8” FLUSH MOUNT PLUG
5/8” DRAIN HOSE B
1/2” DRAIN HOSE E
CONDENSATE TRAP DRAIN PLUG 559°
CONDENSATE TRAP BRACKET (DOWN FLOW)
1/4” BLACK VENT TUBE

TOOLS/MATERIALS NEEDED:
ELECTRIC DRILL (1) 1/8” DRILL BIT
(1) 3/16” DRILL BIT PLIERS
(1) 1/4” HEX HEAD DRIVER
(1) 5/16 HEX HEAD DRIVER
FLAT HEAD SCREWDRIVER
TUBE CUTTER

NOTE: THESE CONVERSION INSTRUCTIONS ARE INTENTIONALLY GENERIC, SOME PARTS MAY BE DIFFERENT IN YOUR FURNACE
NOTE: STEPS 1-5 SHOWN WITH FURNACE IN “AS SHIPPED CONFIGURATION”

1a - REMOVE FLUE TRANSITION, TRANSITION COUPLING, AND ELBOW.
(NOTE: REMOVE COUPLING ON INDUCER WITH ELBOW FOR EASIER REMOVAL)

1b - REMOVE TRAP AND HOSES. RETAIN HOSE D FOR LATER USE.
(NOTE: TO REMOVE TRAP REMOVE (2) SCREWS AND PULL STRAIGHT OUT).

2a - REMOVE 3-3/16” FLUSH MOUNT PLUG FROM JACKET - DISCARD.
2b - RELOCATE 2-3/8” FLUSH MOUNT PLUG FROM JACKET TO TOP PLATE.
2c - RELOCATE 1/2” VINYL CAP (YELLOW) IN INDUCER COUPLING.
2d - INSTALL 2-5/8” FLUSH PLUG IN TOP PLATE.

ST-A1194-30:X0
3a - RELOCATE .403" DRAIN PLUG IN THE COLLECTOR BOX.
3b - INSTALL 2" PIPE GROMMET
3c - INTAKE COUPLING IN JACKET AS SHOWN.
3d - INSERT AIR DIFFUSER INTO COUPLING UNTIL TABS ARE SEATED.

NOTE: DIFFUSER MAY HAVE A TENDENCY TO FALL OUT OF THE COUPLING AT THIS STEP. THE INSTALLER MAY ELECT TO INSTALL THE DIFFUSER AFTER ROTATING THE FURNACE TO THE HORIZONTAL POSITION.

4a - REMOVE THE SMALL MOUNTING BRACKET AND THE .403" DRAIN PLUG - DISCARD.
4b - INSTALL THE DOWN FLOW CONDENSATE TRAP BRACKET WITH (2) SCREWS AS SHOWN.
4c - INSTALL .559" DRAIN PLUG IN THE CONDENSATE TRAP.

5a - PRE-DRILL (2) Ø3/16" HOLES IN JACKET AS SHOWN FOR CONDENSATE TRAP BRACKET.
5b - ROTATE UNIT 180°
NOTE: REMAINING STEPS SHOWN WITH FURNACE IN DOWN FLOW ORIENTATION

6c - CUT 1/4" VENT TUBE TO FIT (APPROX. 10-1/2"). INSTALL AS SHOWN.
6d - INSTALL HOSE D (REMOVED IN STEP 1) FROM INDUCER COUPLING TO THE FLUE TAP IN THE CONDENSATE TRAP.
6e - INSTALL HOSE E FROM COLLECTOR BOX TO TOP OF CONDENSATE TRAP.

6a - INSTALL CONDENSATE TRAP BY MOUNTING BRACKET TO JACKET USING (2) SCREWS

APPROXIMATELY 10-20° TILT ON INDUCER COUPLING

ROTATE INDUCER COUPLING TO ENSURE DOWNWARD FLOW OF CONDENSATE FROM FLUE VENTING

NOTE:
USE SOAPY WATER TO FACILITATE EASY HOSE AND TUBE ASSEMBLY

6b - INSTALL CONDENSATE TRAP BY MOUNTING BRACKET TO JACKET USING (2) SCREWS

INSTALL IN JACKET WITH THE BARBED FITTING POINTED INTO THE VESTIBULE.

OPTION: LEFT DRAIN

1/8" DRILL

DISCARD 7/8" PLUG

DETERMINE RIGHT OR LEFT DRAIN OPTION.
LOCATE 7/8" HOLE IN JACKET SIDE AND REMOVE PLUG - DISCARD.
DRILL (2) Ø 1/8" HOLES FOR CONDENSATE DRAIN COUPLING.

OPTION: RIGHT DRAIN

1/8" DRILL

DISCARD 7/8" PLUG

INSTALL CONDENSATE DRAIN COUPLING USING (2) SCREWS. INSTALL IN JACKET WITH THE BARBED FITTING POINTED INTO THE VESTIBULE.

9a - LEFT SIDE DRAIN OPTION

9a -1. REMOVE HOSE A (FACTORY INSTALLED ON CONDENSATE TRAP) & REPLACE WITH HOSE B REUSING SUPPLIED CLAMP.
9a -2. CUT TUBE C ON MARKED LINES CORRESPONDING TO CABINET WIDTH.
9a -3. ROTATE RUBBER HOSE ON TUBE C SO THAT SIDE "1" CONNECTS TO PVC & SIDE "2" TO CONDENSATE DRAIN COUPLING. INSTALL CLAMP OVER HOSE ON CONDENSATE DRAIN COUPLING.
9a -4. INSTALL TUBE C USING HOSE CLAMP.

NOTE:
USE SOAPY WATER TO FACILITATE EASY HOSE AND TUBE ASSEMBLY

9b - RIGHT SIDE DRAIN OPTION

ATTACH HOSE A (FACTORY INSTALLED) TO CONDENSATE DRAIN COUPLING. INSTALL CLAMP OVER HOSE ON CONDENSATE DRAIN COUPLING.
Checklist:

____ VERIFY ALL HOSES ARE SECURE AND FULLY SEATED.
____ ALL DRAIN PORTS ARE PLUGGED
____ UNIT HAS FORWARD PITCH
____ HEAT TAPE INSTALLED (IF REQUIRED)
____ CONFIRM THAT ALL HOSES ARE FREE OF KINKS
____ CONFIRM ALL HOSES AND OTHER DRAIN PARTS HAVE A SLOPE IN DIRECTION OF WATER FLOW
____ BOTH WORM DRIVES ON THE HOSE CLAMPS OF THE IDB COUPLING MUST BE LOCATED ON THE TOP OF THE COUPLING. SEE LOCATION DETAIL IN THE GENERAL CONVERSION INSTRUCTIONS AT THE BEGINNING OF THIS SECTION
____ ALL CLAMPS AND COUPLINGS ARE TIGHTENED
____ DOUBLE CHECK DIFFUSER IS INSTALLED IN INTAKE COUPLING

Notes:
DOWN FLOW ZERO CLEARANCE

PARTS NEEDED:
FROM PARTS BAG PROVIDED W/UNIT
- INTAKE COUPLING W/ NUT
- CONDENSATE DRAIN COUPLING
- #8 X 1/2" SCREW
- HOSE CLAMP
- ALTERNATE DRAIN ASSEMBLY TUBE C
- INTAKE AIR DIFFUSER

FROM CONVERSION KIT RXGY-CK
- 2-5/8" FLUSH MOUNT PLUG
- #8 X 1/2" SCREW
- 1/4" BLACK VENT TUBING
- 5/8" DRAIN HOSE B
- .559" CONDENSATE TRAP DRAIN PLUG
- 1/2" DRAIN HOSE E
- CONDENSATE TRAP BRACKET (DOWN FLOW)

FROM ZERO-CLEARANCE CONVERSION KIT RXGY-ZK
- #8 X 1/2" SCREW
- PIPE COLLAR/GASKET ASSEMBLY
- INTAKE PIPE
- FLUE PIPE ASSEMBLY W/ O-RING
- O-RING

TOOLS/MATERIALS NEEDED:
- ELECTRIC DRILL
- 1/8" DRILL BIT
- 3/16" DRILL BIT
- PLIERS
- TUBING CUTTER
- 1/4" HEX HEAD DRIVER
- 5/16 HEX HEAD DRIVER
- PVC GLUE AND PRIMER
- HAMMER
- FLAT HEAD SCREWDRIVER

NOTE: THESE CONVERSION INSTRUCTIONS ARE INTENTIONALLY GENERIC, SOME PARTS MAY BE DIFFERENT IN YOUR FURNACE
NOTE: STEPS 1-4 SHOWN WITH FURNACE IN "AS SHIPPED CONDITION"

1. FLUE TRANSITION (DISCARD)
   - TRANSITION COUPLING (RETAIN)
   - ELBOW "RETAIN"
   - IDB COUPLING (RETAIN)
   - VENT HOSE (RETAIN)
   - HOSE "D" (RETAIN)

1a - REMOVE ELBOW. (2) COUPLINGS, AND FLUE TRANSITION. (RETAIN ELBOW AND COUPLINGS FOR LATER USE.)
   (NOTE: REMOVE COUPLING ON INDUCER WITH ELBOW FOR EASIER REMOVAL).

1b - REMOVE TRAP AND HOSES. RETAIN HOSE D FOR LATER USE.
   (NOTE: TO REMOVE TRAP REMOVE (2) SCREWS AND PULL STRAIGHT OUT).

2. INSTALL 2-5/8" FLUSH MOUNT PLUG.
2a - INSTALL 2-5/8" FLUSH MOUNT PLUG IN BLOWER SHELF - DISCARD.
2b - REMOVE LEFT 2-3/8" FLUSH PLUG IN BLOWER SHELF - DISCARD.
2c - RELOCATE RIGHT 2-3/8" FLUSH MOUNT PLUG FROM BLOWER SHELF TO TOP PLATE.
2d - RELOCATE .403" DRAIN PLUG IN THE COLLECTOR BOX.
NOTE: REMAINING STEPS SHOWN W/ FURNACE IN DOWN FLOW ORIENTATION

5a - ROTATE UNIT 180°
5b - REMOVE KNOCKOUTS WITH HAMMER AND FLAT HEAD SCREWDRIVER.
5c - THE JUNCTION BOX WILL HAVE TO BE RELOCATED FOR FLUE PIPE INSTALLATION. SEE ELECTRICAL WIRING SECTION FOR INSTRUCTIONS.
5d - RE-DRILL (2) Ø1/8” HOLES IN BLOWER SHELF AS SHOWN FOR FLUE PIPE ASSEMBLY.
5e - PRE-DRILL (2) Ø3/16” HOLES IN JACKET AS SHOWN FOR CONDENSATE TRAP BRACKET.

6

INSTALL INTAKE COUPLING IN BLOWER SHELF HOLE AS SHOWN.
INSERT AIR DIFFUSER INTO COUPLING UNTIL TABS ARE SEATED.

7

7a - REMOVE THE SMALL MOUNTING BRACKET AND THE .403” DRAIN PLUG - DISCARD.
7b - INSTALL .559” DRAIN PLUG IN CONDENSATE TRAP.
7c - INSTALL DOWN FLOW CONDENSATE TRAP BRACKET WITH (2) SCREWS AS SHOWN.
Determine right or left drain option.
Locate 7/8" hole in jacket side, remove plug - discard.
Drill (2) 3/8" holes for the condensate drain coupling.

Install condensate drain coupling using (2) screws.
Install in jacket with the barbed fitting pointed into the vestibule.

10a - Install intake pipe
Slide intake pipe through the left side knockout on cover plate. Clean and PVC glue to intake coupling as shown.

10b - Install flue pipe assembly
Insert flue pipe assembly through right side knockout on cover plate (note: slide from under plate). Slide angled end through opening in blower shelf and align with elbow coupling. Secure pipe assembly to blower shelf with (2) screws as shown. Ensure O-ring is properly seated.

10c - Slide pipe collar assemblies from step 7 over the (2) pipes and drill (8)
#11/8" holes using the collars as templates. Secure with screws.
NOTE:
USE SOAPY WATER TO FACILITATE EASY HOSE AND TUBE ASSEMBLY

11a
APPROXIMATELY 10-20° TILT ON INDUCER COUPLING

11a - ROTATE INDUCER COUPLING 10°
   NOTE: TIGHTEN ELBOW COUPLING CLAMPS TO FLUE PIPE WITH 5/16" NUT DRIVER. (NOT SHOWN)

11b - INSTALL CONDENSATE TRAP BY MOUNTING BRACKET TO JACKET USING (2) SCREWS.

11c - CUT 1/4" VENT TUBE TO FIT (APPROX.10-1/2"). INSTALL AS SHOWN.

11d - INSTALL HOSE D (REMOVED IN STEP 1) FROM TRANSITION COUPLING TO THE FLUE TAP ON THE CONDENSATE TRAP.

11e - ATTACH HOSE E TO THE TOP OF CONDENSATE TRAP.

12a
OPTION DRAIN LEFT SIDE

12a - LEFT SIDE DRAIN OPTION
12a-1 - REMOVE HOSE A (FACTORY INSTALLED) ON CONDENSATE TRAP & REPLACE WITH HOSE B REUSING SUPPLIED CLAMP.
12a-2 - CUT TUBE C ON MARKED LINES CORRESPONDING TO CABINET WIDTH.
12a-3 - ROTATE RUBBER HOSE ON TUBE C SO THAT SIDE "1" CONNECTS TO PVC & SIDE "2" TO BULKHEAD COUPLING. PLACE CLAMP OVER HOSE ON BULKHEAD COUPLING
12a-4 - INSTALL TUBE C USING HOSE CLAMP.

NOTE:
USE SOAPY WATER TO FACILITATE EASY HOSE AND TUBE ASSEMBLY

12b
OPTION DRAIN RIGHT SIDE

12b - RIGHT SIDE DRAIN OPTION
12b-1 - ATTACH HOSE A (FACTORY INSTALLED) TO BULKHEAD COUPLING. PLACE CLAMP OVER HOSE ON BULK HEAD COUPLING.

NOTE:
USE SOAPY WATER TO FACILITATE EASY HOSE AND TUBE ASSEMBLY
Checklist:

- Verify all hoses are secure and fully seated.
- Confirm that all hoses are free of kinks.
- Confirm all hoses and other drain parts have a slope in direction of water flow.
- Both worm drives on the hose clamps of the ID8 coupling must be located on the top of the coupling. See location detail in the general conversion instructions at the beginning of this section.
- All drain ports are plugged.
- Unit has forward pitch.
- Heat tape installed (if required).
- All clamps and couplings are tightened.

Notes:
PARTS NEEDED:
FROM PARTS BAG (PROVIDED WITH UNIT) | FROM CONVERSION KIT RXGY-CK
--- | ---
INTAKE COUPLING AND NUT | 1/2" DRAIN HOSE E
1/2" DRAIN HOSE F | CONDENSATE TRAP GASKET
#8 X 1/2" SCREW | 1/4" BLACK VENT TUBE

TOOLS/MATERIALS NEEDED:
ELECTRIC DRILL | PLIERS | 5/16 HEX HEAD DRIVER
1/8" DRILL BIT | FLAT HEAD SCREWDRIVER | 1/4" HEX HEAD DRIVER

NOTE: THESE CONVERSION INSTRUCTIONS ARE INTENTIONALLY GENERIC, SOME PARTS MAY BE DIFFERENT IN YOUR FURNACE
NOTE: STEPS 1-5 SHOWN WITH FURNACE IN "AS SHIPPED CONDITION"

1. 1a - REMOVE TRAP AND HOSES (NOTE: TO REMOVE TRAP, REMOVE (2) SCREWS AND PULL STRAIGHT OUT)
   1b - INSTALL INTAKE COUPLING IN TOP PLATE AS SHOWN.

2. 2a - RELOCATE 1/2" VINYL CAP (YELLOW) ON THE INDUCER COUPLING
   2b - RELOCATE THE .403" DRAIN PLUG IN THE COLLECTOR BOX.
   2c - RELOCATE 1/4" VINYL CAP (YELLOW) ON COLLECTOR BOX VENT TAP.
3 - REMOVE RECTANGLE FLUSH MOUNT PLUG FROM JACKET SIDE-DISCARD
3b - PRE-DRILL (3) Ø 1/8" HOLES AS SHOWN FOR CONDENSATE TRAP

4a - REMOVE METAL BRACKET AND THE Ø 0.403 DRAIN PLUG- DISCARD.
4b - REMOVE HOSE A - DISCARD
4c - INSTALL Ø 0.59" CONDENSATE DRAIN PLUG AND CONDENSATE TRAP GASKET AS SHOWN.
4d - INSTALL CONDENSATE TRAP IN JACKET USING (3) SCREWS.

NOTE:
TO PREVENT DAMAGE TO THE TRAP, THE INSTALLER MAY ELECT TO INSTALL IT DURING A LATER STEP.
(AFTER THE UNIT IS ROTATED)

NOTE: REMAINING STEPS SHOWN WITH FURNACE IN HORIZONTAL RIGHT ORIENTATION

5a - ROTATE UNIT 90°
5b - CUT 1/4" VENT HOSE TO FIT (APPROX. 5-1/2") AND INSTALL AS SHOWN.
5c - CUT HOSE E AT LINE 1- INSTALL

NOTE: MAKE SURE CUT IS STRAIGHT AND SQUARE
5d - CUT HOSE F ON LINE CORRESPONDING TO UNIT WIDTH AND INSTALL
NOTE: 17.5"- LINE 1, 21"- LINE 2, 24.5"- DO NOT CUT
Checklist:

____ VERIFY ALL HOSES ARE SECURE AND FULLY SEATED.
____ CONFIRM THAT ALL HOSES ARE FREE OF KINKS.
____ CONFIRM ALL HOSES AND OTHER DRAIN PARTS HAVE A
SLOPE IN DIRECTION OF WATER FLOW.
____ BOTH WORM DRIVES ON THE HOSE CLAMPS OF THE FLUE TRANSITION
MUST BE LOCATED ON THE TOP OF THE COUPLING. SEE LOCATION
DETAIL IN THE GENERAL CONVERSION INSTRUCTIONS AT THE
BEGINNING OF THIS SECTION.
____ ALL CLAMPS AND COUPLINGS ARE TIGHTENED
____ ALL DRAIN PORTS ARE PLUGGED.
____ UNIT HAS FORWARD PITCH.
____ HEAT TAPE INSTALLED(IF REQUIRED)

Notes:
HORIZONTAL RIGHT / VERTICAL VENT

PARTS NEEDED:

![Intake Coupling and Nut](image1)

![Intake Air Diffuser](image2)

FROM PARTS BAG (PROVIDED WITH UNIT)

FROM CONVERSION KIT RXGY-CK

![1/2" Drain Hose E](image3)

![1/2" Drain Hose F](image4)

![Condensate Trap Gasket](image5)

![#8 x 1/2" Screw](image6)

![1/4" Black Vent Tube](image7)

![2" Pipe Grommet](image8)

![2-5/8" Flush Mount Plug](image9)

TOOLS/MATERIALS NEEDED:

<table>
<thead>
<tr>
<th>Electric Drill</th>
<th>Pliers</th>
<th>5/16 Hex Head Driver</th>
<th>1/4&quot; Hex Head Driver</th>
<th>Tubing Cutter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8&quot; Drill Bit</td>
<td>Flat Head Screwdriver</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: THESE CONVERSION INSTRUCTIONS ARE INTENTIONALLY GENERIC, SOME PARTS MAY BE DIFFERENT IN YOUR FURNACE.

NOTE: STEPS 1-5 SHOWN WITH FURNACE IN "AS SHIPPED CONDITION".

1

1a - REMOVE FLUE TRANSITION, TRANSITION COUPLING, AND ELBOW. (NOTE: REMOVE INDUCER COUPLING W/ ELBOW FOR EASIER REMOVAL)

1b - REMOVE CONDENSATE TRAP AND HOSES. (NOTE: TO REMOVE TRAP REMOVE (2) SCREWS AND PULL STRAIGHT OUT).

2

2a - RELOCATE 1/2" VINYL CAP (YELLOW) ON THE INDUCER COUPLING.

2b - REMOVE 3-3/8" FLUSH MOUNT PLUG FROM JACKET SIDE-DISCARD.

2d - INSTALL 2-5/8" FLUSH MOUNT PLUG IN TOP PLATE.

[Diagram of furnace parts and conversion process]

NOTE: IF THE IDB COUPLING IS REMOVED, IT MUST BE REPLACED IN THE PROPER ORIENTATION. AN ARROW IS PRESENT ON THE COUPLING TO INDICATE THE DIRECTION OF EXHAUST FLOW. MAKE SURE THE ARROW POINTS IN THE CORRECT DIRECTION.

ST-A1194-33-01
3a - RELOCATE THE Ø .403" DRAIN PLUG IN THE COLLECTOR BOX.
3b - RELOCATE 1/4" VINYL CAP (YELLOW) ON COLLECTOR BOX VENT TAP.

4a - REMOVE RECTANGLE FLUSH MOUNT PLUG FROM JACKET SIDE - DISCARD
4b - PRE-DRILL (3) Ø1/8" HOLES AS SHOWN FOR CONDENSATE TRAP
4c - INSTALL 2" PIPE GROMMET IN JACKET
4d - SLIDE AIR DIFFUSER INTO INTAKE COUPLING
     AND INSTALL INTO JACKET AS SHOWN.

5a - REMOVE METAL BRACKET AND THE Ø .403 DRAIN PLUG - DISCARD.
5b - REMOVE HOSE A - DISCARD
5c - INSTALL Ø .559" CONDENSATE DRAIN PLUG AND CONDENSATE TRAP GASKET AS SHOWN.
5d - INSTALL CONDENSATE TRAP IN JACKET USING (3) SCREWS.

NOTE:
TO PREVENT DAMAGE TO THE TRAP, THE INSTALLER MAY ELECT TO INSTALL IT DURING A LATER STEP.
(AFTER THE UNIT IS ROTATED)
6

**Checklist:**

- Verify all hoses are secure and fully seated.
- Confirm that all hoses are free of kinks.
- Confirm all hoses and other drain parts have a slope in direction of water flow.
- All clamps and couplings are tightened.
- All drain ports are plugged.
- Unit has forward pitch.
- Heat tape installed (if required).

**Notes:**
**HORIZONTAL LEFT / RIGHT VENT**

**PARTS NEEDED:**

<table>
<thead>
<tr>
<th>FROM PARTS BAG (PROVIDED WITH UNIT)</th>
<th>FROM CONVERSION KIT RXGY-CK</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTAKE COUPLING AND NUT</td>
<td>2-5/8&quot; FLUSH MOUNT PLUG</td>
</tr>
<tr>
<td>INTAKE AIR DIFFUSER</td>
<td>(X4)</td>
</tr>
<tr>
<td>1/4&quot; BLACK VENT TUBE</td>
<td>559° CONDENSATE TRAP DRAIN PLUG</td>
</tr>
<tr>
<td>1/2&quot; DRAIN HOSE E</td>
<td>1/2&quot; DRAIN HOSE E</td>
</tr>
<tr>
<td>1/2&quot; VINYL CAP (YELLOW)</td>
<td>O-RING</td>
</tr>
<tr>
<td></td>
<td>(X1)</td>
</tr>
<tr>
<td>#8 X 1/2&quot; SCREW</td>
<td>PIPE COLLAR / GASKET ASSEMBLY</td>
</tr>
<tr>
<td></td>
<td>1/2&quot; DRAIN HOSE G</td>
</tr>
<tr>
<td></td>
<td>INTAKE PIPE</td>
</tr>
<tr>
<td></td>
<td>FLUE PIPE ASSEMBLY W/ O-RING</td>
</tr>
</tbody>
</table>

**FROM CONVERSION KIT RXGY-ZK**

|                                 | (X10)                         |
|                                 | (X2)                          |

| #8 X 1/2" SCREW                  | #8 X 1/2" SCREW               |

**TOOLS/MATERIALS NEEDED:**

<table>
<thead>
<tr>
<th>PVC GLUE AND PRIMER</th>
<th>1/8&quot; DRILL BIT</th>
<th>1/4&quot; DRILL BIT</th>
<th>PLIERS</th>
<th>1/4&quot; HEX HEAD DRIVER</th>
<th>5/16 HEX HEAD DRIVER</th>
<th>TUBING CUTTER</th>
</tr>
</thead>
</table>

**NOTE:** THESE CONVERSION INSTRUCTIONS ARE INTENTIONALLY GENERIC, SOME PARTS MAY BE DIFFERENT IN YOUR FURNACE.

**NOTE:** STEPS 1-4 SHOWN WITH FURNACE IN "AS SHIPPED CONDITION"

1. **TRANSITION (DISCARD)**
   - REMOVE ELBOW, (2) COUPLINGS, AND FLUE TRANSITION.
   - NOTE: RETAIN ELBOW AND COUPLINGS FOR LATER USE.
   - 1b - REMOVE TRAP AND HOSES. RETAIN HOSE D FOR LATER USE.
   - NOTE: TO REMOVE TRAP REMOVE (2) SCREWS AND PULL STRAIGHT OUT

2. **TRANSITION COUPLING (RETAIN)**
   - ELBOW (RETAIN)
   - IDB COUPLING (RETAIN)
   - HOSE "D" (RETAIN)
   - VENT HOSE (DISCARD)
   - DISCARD 2b

2a - INSTALL 2-5/8" FLUSH MOUNT PLUG.
2b - REMOVE LEFT 2-3/8" FLUSH PLUG IN BLOWER SHELF - DISCARD.
2c - RELOCATE RIGHT 2-3/8" FLUSH MOUNT PLUG FROM BLOWER SHELF TO TOP PLATE.
2d - RELOCATE Ø.403" DRAIN PLUG IN THE COLLECTOR BOX.
2e - REMOVE RECTANGLE FLUSH MOUNT PLUG-DISCARD
3

INSTALL HOSE G ON COLLECTOR BOX AS SHOWN.
NOTE: LET THE OPEN END HANG FREE UNTIL STEP 10.

4

4a - RE-INSTALL ELBOW AND COUPLINGS (FROM STEP 1) IN THE ORIENTATION AS SHOWN.
4b - REMOVE Ø .403" DRAIN PLUG FROM ELBOW DRAIN PORT - DISCARD.
4c - INSTALL 1/2" VINYL CAP (YELLOW) ON INDUCER COUPLING.
NOTE: LEAVE COUPLING CLAMP CONNECTIONS LOOSE UNTIL STEP 10.

NOTE:
IF THE IDB COUPLING IS REMOVED, IT MUST BE REPLACED IN THE PROPER ORIENTATION. AN ARROW IS PRESENT ON THE COUPLING TO INDICATE THE DIRECTION OF EXHAUST FLOW. MAKE SURE THE ARROW POINTS IN THE CORRECT DIRECTION.

5

NOTE: STEPS 5 - 7 SHOWN WITH FURNACE IN DOWNFLOW ORIENTATION

5a - ROTATE UNIT 180°
5b - REMOVE KNOCKOUTS
5c - PRE-DRILL (2) Ø 1/8" HOLES IN BLOWER SHELF AS SHOWN FOR FLUE PIPE ASSEMBLY.
5d - PRE-DRILL (3) Ø 1/8" HOLES IN JACKET AS SHOWN FOR CONDENSATE TRAP.
5e - THE JUNCTION BOX WILL HAVE TO BE RELOCATED FOR FLUE PIPE INSTALLATION
NOTE: SEE ELECTRICAL WIRING SECTION FOR INSTRUCTIONS.
6

Install intake coupling in blower shelf hole as shown. Insert air diffuser into coupling until tabs are seated.

NOTE: Diffuser may have a tendency to fall out of the coupling at this step. The installer may elect to install the diffuser after rotating the furnace to the horizontal position.

7

7a - Install intake pipe: Slide intake pipe through the left side knockout, clean and PVC glue to intake coupling as shown.
7b - Install flue pipe assembly: Insert flue pipe assembly through right side knockout, (Note: slide from under plate) slide angled end through opening in blower shelf and align with elbow coupling. Secure pipe assembly to blower shelf with (2) screws as shown. Ensure o-ring is properly seated.
7c - Slide pipe collar assemblies over the (2) pipes and drill (8) Ø1/8" holes using the collars as a template. Secure with (8) screws as shown.
8a - REMOVE HOSE “A” FROM TRAP ASSEMBLY AND DISCARD.
8b - REMOVE THE SMALL MOUNTING BRACKET AND THE Ø .403” DRAIN PLUG - DISCARD.
8c - INSTALL Ø .559” DRAIN PLUG IN CONDENSATE TRAP.
8d - INSTALL CONDENSATE TRAP GASKET AS SHOWN.
8e - MOUNT THE TRAP IN JACKET SIDE, USING (3) SCREWS.
8f - ROTATE UNIT 90°

9a - ATTACH HOSE G TO THE TOP OF CONDENSATE TRAP.
9b - LOCATE HOSE D (REMOVED IN STEP 1) - CUT ON LINE 1 - INSTALL.
9c - CUT 1/4” VENT TUBE TO FIT (APPROX. 12-1/2”) AND INSTALL AS SHOWN.
9d - ROUTE FROM COLLECTOR BOX TO TOP OF CONDENSATE TRAP.
9e - TIGHTEN ELBOW AND INDUCER CLAMPS TO FLUE PIPE W/ 5/16” NUT DRIVER.

NOTE: REMAINING STEPS SHOWN WITH FURNACE IN HORIZONTAL LEFT ORIENTATION.

NOTE: TO PREVENT DAMAGE TO THE TRAP, THE INSTALLER MAY ELECT TO INSTALL IT DURING A LATER STEP. (AFTER THE UNIT IS ROTATED)
Checklist:

- Verify all hoses are secure and fully seated.
- Confirm that all hoses are free of kinks.
- Confirm all hoses and other drain parts have a slope in direction of water flow.
- Both worm drives on the hose clamps of the flue transition must be located on the top of the coupling. See location detail in the general conversion instructions at the beginning of this section.
- All clamps and couplings are tightened.
- All drain ports are plugged.
- Unit has forward pitch.
- Heat tape installed (if required)

Notes:
HORIZONTAL LEFT / LEFT VENT

PARTS NEEDED:
FROM PARTS BAG (PROVIDED WITH UNIT)

INTAKE COUPLING W/NUT

PARTS NEEDED FOR THIS CONVERSION REQUIRE ITEMS FROM THE PARTS BAG AND CONVERSION KIT RXGY-CK. YOU MUST HAVE THE PARTS OUTLINED BELOW BEFORE PROCEEDING.

FROM CONVERSION KIT RXGY-CK

1/2" VINYL CAP (YELLOW) .559" CONDENSATE TRAP DRAIN PLUG 1/4" BLACK VENT TUBING CONDENSATE TRAP GASKET #8 X 1/2" SCREW 1/2" DRAIN HOSE E

TOOLS/MATERIALS NEEDED:

<table>
<thead>
<tr>
<th>ELECTRIC DRILL</th>
<th>PLIERS</th>
<th>TUBE CUTTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8&quot; DRILL BIT</td>
<td>1/4&quot; HEX HEAD DRIVER</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: THESE CONVERSION INSTRUCTIONS ARE INTENTIONALLY GENERIC, SOME PARTS MAY BE DIFFERENT IN YOUR FURNACE

NOTE: STEPS 1-4 SHOWN WITH FURNACE IN "AS SHIPPED CONFIGURATION"

1 - REMOVE CONDENSATE TRAP AND HOSES.
(RETAIN HOSE D FOR LATER USE.)

(NOTE: TO REMOVE TRAP, REMOVE (2) SCREWS AND PULL STRAIGHT OUT).

2a - REMOVE .403" DRAIN PLUG FROM FLUE ELBOW - DISCARD.
2b - INSTALL INTAKE COUPLING IN TOP PLATE.
2c - INSTALL 1/2" VINYL CAP (YELLOW) IN INDUCER COUPLING AS SHOWN.
2d - REMOVE RECTANGLE FLUSH MOUNT PLUG FROM JACKET SIDE-DISCARD.
3

DRILL (3) Ø 1/8” HOLES

PRE-DRILL (3) Ø 1/8” HOLES AS SHOWN FOR CONDENSATE TRAP.

4

4a - REMOVE METAL BRACKET AND 403” DRAIN PLUG - DISCARD.
4b - REMOVE HOSE A - DISCARD
4c - INSTALL Ø 5/8” CONDENSATE DRAIN PLUG
4d - CONDENSATE TRAP GASKET AS SHOWN
4e - INSTALL CONDENSATE TRAP IN JACKET USING (3) SCREWS.

NOTE:
TO PREVENT DAMAGE TO THE TRAP, THE INSTALLER MAY ELECT TO INSTALL IT DURING A LATER STEP. (AFTER THE UNIT IS ROTATED)

5

CUT LINE 1

INSTALL

CUT LINE 2

Hose "D"

Hose "E"

SEE CRITICAL HOSE CLAMP LOCATION NOTE IN THE GENERAL CONVERSION INSTRUCTIONS.

5a - ROTATE UNIT 90°
5b - CUT 1/4” VENT HOSE TO FIT (APPROX. 6-1/2”) AND INSTALL AS SHOWN.
5c - CUT HOSE E AT LINE 1 - INSTALL
5d - CUT HOSE D (REMOVED IN STEP 1) AT LINE 2 - INSTALL

NOTE:
USE SOAPY WATER TO FACILITATE EASY HOSE AND TUBE ASSEMBLY
Checklist:

- Verify all hoses are secure and fully seated.
- Confirm that all hoses are free of kinks.
- Confirm all hoses and other drain parts have a slope in direction of water flow.
- Both worm drives on the hose clamps of the flue transition must be located on the top of the coupling. See location detail in the general conversion instructions at the beginning of this section.
- All clamps and couplings are tightened
- All drain ports are plugged.
- Unit has forward pitch.
- Heat tape installed (if required)

Notes:
External filter racks are available from the distributor. Use the following part numbers when ordering:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXGF-CA</td>
<td>External Side Filter Rack Kit</td>
</tr>
<tr>
<td>RXGF-CB</td>
<td>External Bottom Filter Rack Kit</td>
</tr>
<tr>
<td>RXGF-CC</td>
<td>External Filter Rack Kit - Downflow</td>
</tr>
</tbody>
</table>

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

**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.

**NOTE:** Both flanges on the supply and return openings must be bent either up or down but cannot remain flat as shipped from the factory. See Figure 9 for details.

**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 AIRFLOW DISTRIBUTION SYSTEM TO ACCEPTABLE INDUSTRY STANDARDS AND METHODS. TOTAL STATIC PRESSURE DROP OF THE AIR DISTRIBUTION SYSTEM SHOULD NOT EXCEED .8INCHES W.C. THIS WILL INCLUDE ANY AIR CONDITIONER COIL, AIR FILTRATION SYSTEM, ZONING SYSTEM, DUCTWORK, ETC. REFER TO ADDED EQUIPMENT TECHNICAL INFORMATION TO OBTAIN PRESSURE DROP INFORMATION WHEN EQUIPMENT IS OPERATING AT RECOMMENDED HEATING OR COOLING CFMS.

**UPFLOW INSTALLATIONS**

1. Position the unit to minimize long runs of duct or runs of duct with many turns and elbows.
2. For side return: Cut an opening in the side. The opening should be cut the full width and height of the knockouts on the unit. See Figure 10.
3. If summer air conditioning is desired, position the indoor coil on the supply-air side of the unit. Ensure that no air can bypass the coil.
4. Connect the furnace to the supply air plenum.
5. Connect the return air ducting to the return-air opening at the bottom and/or side of the unit. Make the connections air-tight to prevent the migration of toxic fumes and odors including carbon monoxide from migrating into the living space.
6. If a filter is installed near the furnace, be sure to have adequate space for installation and removal of the unit filter.
7. **NOTE:** Where the maximum airflow is 1800 CFM or more, BOTH sides or the bottom must be used for the return air.

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

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. Ensure 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 11.

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 the migration of toxic fumes and odors including carbon monoxide from migrating into the living space from an adjacent fuel-burning appliance.

WARNING

UPFLOW FURNACE: THE SOLID METAL BASE PLATE (SHIPPED WITH THE FURNACE) MUST BE INSTALLED 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, A SOLID METAL BASE PAN MUST NOT BE INSTALLED.

NOTE:

In downflow configuration, side return air cut out is not permitted.

6. If a filter is installed near the furnace, be sure to have adequate space for installation and removal of the unit filter.

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

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. Ensure 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 return-air end of the unit. Make the connection air tight to prevent the migration of toxic fumes and odors including carbon monoxide from migrating into the living space from an adjacent fuel-burning appliance.

NOTE: If a filter is installed near the furnace, be sure to have adequate space for installation and removal of the unit filter.

NOTE: DO NOT take return air from furnace rooms, garages or cold areas. Avoid return air from utility rooms, kitchens, laundry rooms and bathrooms.
This furnace removes both sensible and latent heat from the combustion gases. Removal of latent heat results in the condensation of flue gas water vapor. This condensed water vapor drains from the secondary heat exchanger and out of the unit into the drain trap.

When installed as a non-direct vent furnace, only exhaust piping is required and inside combustion air may be used. Refer to the section on “NON-DIRECT VENTING.”

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.

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), in Canada CSA B149.1; Canadian Natural Gas and Propane Installation Code and The National Fire Code of Canada, 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 the warranty coverage.

Combustion air must be free of acid-forming chemicals such as sulfur, 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.

The following types of installations (but not limited to the following) may require outdoor air for combustion (direct vent) 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

If combustion air is exposed to the following substances (but not limited to the following), it should not be used and the furnace may require outdoor air for combustion (direct vent).
- 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
- Printing inks, paint removers, varnishes etc.
- Cleaning solvents (such as perchloroethylene)
- Hydrochloric acid
- Cements and glues
- Antistatic fabric softeners for clothes dryers
- Masonry curing and acid washing materials

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.

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 furnace and 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 (NFPA 54), in Canada CSA B149.1; Canadian Natural Gas and Propane Installation Code and The National Fire Code of Canada, 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.
GENERAL VENTING REQUIREMENTS AND GUIDELINES

VENTING & COMBUSTION AIR REQUIREMENTS (cont.)

IMPORTANT: ONLY THE CURRENT VENT INSTRUCTIONS APPLY. All 90 Plus Gas Furnaces cannot be common-vented.

OVERTEMPERATURE SAFETY SWITCHES
Furnaces are equipped with safety switches in the burner compartment to protect against over-temperature 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 after clearing the fault condition which caused it to open.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO NOT BYPASS, JUMPER, OR REMOVE ANY SAFETY SWITCH FROM THE FURNACE CONTROL CIRCUIT. IF A SAFETY SWITCH CAUSES THE FURNACE TO SHUT DOWN OR OPERATE INTERMITTENTLY, IT IS AN INDICATION OF A POTENTIAL SAFETY HAZARD THAT MUST BE ADDRESSED BY A QUALIFIED TECHNICIAN, SERVICE AGENCY OR THE GAS SUPPLIER. DO NOT RESET SAFETY CONTROLS WITHOUT CORRECTIVE ACTION AND/OR VERIFICATION OF PROPER SAFE OPERATION BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.</td>
</tr>
<tr>
<td>REPLACE ANY SAFETY CONTROL COMPONENT ONLY WITH IDENTICAL OEM REPLACEMENT PARTS</td>
</tr>
</tbody>
</table>

MATERIAL REQUIREMENTS

PIPING REQUIREMENTS
The combustion air and vent pipe fittings must conform to American National Standards Institute (ANSI) and American Society for Testing Materials (ASTM) standards D1785 (Schedule 40 PVC), D2241 (SDR-21 & SDR26-26 PVC), D2661 (ABS-DWV) or F628 (Schedule 40 ABS-DWV). For Canada PVC, CPVC and polypropylene venting can be used and must conform with ULCS-636C requirements.

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

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

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

All exhaust piping must be installed in compliance with the chapter titled; “Venting of Appliances” in the latest edition of the National Fuel Gas Code, NFPA-54/ANSI Z223.1, CSA B149.1; Canadian Natural Gas and Propane Installation Code (Canada), local codes or ordinances and these instructions.

1. All horizontal piping must slope upward from the furnace with a minimum slope of ¼ inch per foot of horizontal vent so that condensate drains back toward the furnace.
2. All horizontal runs must be supported at least every 4 feet. No sags or dips are permitted.
3. 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 plastic pipe and other pipes. For Canada PVC, CPVC and polypropylene can be used as long as they conform with ULCS-636C requirements.
4. All vent installed through unconditioned spaces where below-freezing temperatures are expected should be insulated with an approved insulating material. Materials such as Armaflex or Rubatex 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 watt or 6 watt heat tape. The heat tape must be U.L. listed and
GENERAL VENTING REQUIREMENTS AND GUIDELINES

VENTING & COMBUSTION AIR REQUIREMENTS (cont.)

installed per the manufacturer’s instructions. NOTE: Never cover heat tape with insulation.

5. The minimum vent pipe length is 5 feet [1.5m].

6. IMPORTANT: No part of the combustion air and/or vent pipes may be installed underground.

7. Piping at a roof, wall or other penetration must be immobilized to prevent pipes from disconnecting. Disconnected pipes may allow flue products to be released inside the structure.

8. For Direct Vent systems, all pipe penetrations through roof or sidewall must be installed so that the vent and combustion air intake pipes terminate in the same atmospheric pressure zone.

9. Vent terminations must be installed with the minimum clearances specified in the TERMINATION REQUIREMENTS sections of this manual and Figure 21 (for Non-Direct Vent) and Figure 32 (for direct Vent installations).

10. Piping external to the structure (excluding approved venting terminations) and vent passing through unheated crawl-spaces, attics, verandas, patios or decks must be insulated with approved insulating material to prevent freezing as required for local climate.

JOINING PIPE AND FITTINGS

WARNING

PVC/CPVC SOLVENT CEMENTS AND PRIMERS ARE HIGHLY FLAMMABLE. PROVIDE ADEQUATE VENTILATION AND DO NOT ASSEMBLE NEAR A 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 be installed following the vent manufacturer’s installation instructions and must conform to American National Standards Institute and American Society for Testing Materials (ANSI/ASTM) standards as shown in the Table 2 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 within the socket. Quickly apply a heavy coat of cement to the pipe end and insert pipe into the fitting with a slight twisting movement until it bottoms out.

NOTE: Cement must be fluid. If not, re-coat.

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 applications below 32°F, use only low-temperature type solvent cement.

TABLE 2: APPLICABLE ASTM STANDARDS FOR VENT MATERIALS (U.S. Only)

<table>
<thead>
<tr>
<th>Materials</th>
<th>Sch. 40 Pipe</th>
<th>SDR Pipe</th>
<th>Cell Core Pipe</th>
<th>Fittings</th>
<th>Primer</th>
<th>Solv. Cement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>D1527</td>
<td>-</td>
<td>F628</td>
<td>D2468 &amp; D2661</td>
<td>-</td>
<td>D2235</td>
</tr>
<tr>
<td>PVC</td>
<td>D1785</td>
<td>D2241</td>
<td>F891</td>
<td>D2466 &amp; D2665</td>
<td>F656</td>
<td>D2564</td>
</tr>
<tr>
<td>CPVC</td>
<td>F441</td>
<td>F442</td>
<td>-</td>
<td>F348</td>
<td>-</td>
<td>F493</td>
</tr>
</tbody>
</table>

For Canadian installations all exhaust venting materials must be certified to ULCS-636C.
VENT PIPE SIZING AND MAXIMUM VENT LENGTHS

EQUIVALENT VENT LENGTHS

The concept of equivalent vent lengths is frequently used in piping systems to account for pressure drop of fittings, such as elbows. The equivalent length of a fitting is the length of a straight section of pipe that has an equivalent pressure drop in the application as the fitting used. With the equivalent length vent concept, a vent system can use up to the maximum number of elbows and vent length of straight pipe as long as the maximum equivalent vent length is not exceeded.

There are several different types of elbows that can be used when constructing a vent system. Figure 12 shows the standard dimensions for standard and long-sweep 90° (1/4 turn) elbows as specified by ASTM 3311, Standard Specification for Drain, Waste and Vent (DWV) Plastic Fittings Patterns.

A long-sweep (AKA Long-Radius) 90° (1/4 turn) elbow has an equivalent vent length of 5 feet of straight pipe for either 2 inch or 3 inch plastic pipe. A standard 90° elbow has an equivalent vent length of 10 feet of straight pipe. This equivalent length can be used in circumstances where it might be necessary to lengthen the vent at the outside of the structure, such as in areas with large accumulations of snow in winter. Table 3 shows the equivalent lengths of different types of elbows.

Table 3: EQUIVALENT VENT LENGTH OF COMMON VENT ELBOWS

<table>
<thead>
<tr>
<th>Fitting Type</th>
<th>Equivalent Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>90° Standard Elbow</td>
<td>10 Feet of Pipe</td>
</tr>
<tr>
<td>45° Long-Sweep Elbow</td>
<td>2-1/2 Feet of Pipe</td>
</tr>
<tr>
<td>90° Long-Sweep Elbow</td>
<td>5 Feet of Pipe</td>
</tr>
</tbody>
</table>

Table 4 specifies the equivalent maximum vent lengths specified by the manufacturer for each furnace. Listed table maximums have been qualified by the manufacturer. Dependant on individual installation specifics, installations beyond the table recommendations may cause erratic pressure switch operation.

Examples:

1. A 60KBTU direct-vent installation needs a 31 foot long vent run with qty=5, 90° long-sweep elbows and 2 inch pipe.

   \[
   \text{31 feet of 2 inch pipe} = 31 \text{ equivalent feet} \]
   \[
   \text{Qty = 5, 90° long-sweep elbows} = 25 \text{ equivalent feet} \]
   \[
   \text{Total} = 56 \text{ equivalent feet} \]

   Since the maximum equivalent vent length specified for a 60KBTU furnace is 65 feet, this installation is acceptable.

2. If the installation from Example 1 were installed with standard elbows instead of long-sweep elbows, the calculation would be as follows:

   \[
   \text{31 feet of 2 inch pipe} = 31 \text{ equivalent feet} \]
   \[
   \text{Qty = 5, 90° standard elbows} = 50 \text{ equivalent feet} \]
   \[
   \text{Total} = 81 \text{ equivalent feet} \]

   This installation is NOT acceptable as it exceeds the 65 foot maximum specified for this model.
## GENERAL VENTING REQUIREMENTS AND GUIDELINES

### VENT PIPE SIZING AND MAXIMUM VENT LENGTHS (cont.)

#### TABLE 4: MAXIMUM EQUIVALENT VENT LENGTH
(TABLE IS FOR BOTH DIRECT & NON-DIRECT VENTING)

<table>
<thead>
<tr>
<th>Model</th>
<th>Input (BTU/H)</th>
<th>Pipe Size</th>
<th>Maximum Equivalent Length (Feet)</th>
<th>Recommended Maximum Number of Elbows*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-)96VA0602317MSA &amp; (-)96MDV060B30A</td>
<td>56,000</td>
<td>2 inch Ø</td>
<td>65</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 inch Ø</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>(-)96VA0702317MSA &amp; (-)96MDV070B30A</td>
<td>70,000</td>
<td>2 inch Ø</td>
<td>65</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 inch Ø</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>(-)96VA0852521MSA &amp; (-)96MDV085C50A</td>
<td>84,000</td>
<td>2 inch Ø</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 inch Ø</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>(-)96VA1002521MSA &amp; (-)96MDV100C50A</td>
<td>98,000</td>
<td>2 inch Ø</td>
<td>20</td>
<td>2**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 inch Ø</td>
<td>100</td>
<td>6</td>
</tr>
</tbody>
</table>

**NOTE:** The elbows needed for the vent termination are not counted in these lengths except at altitudes above 6,000 feet. Above 6,000 feet alternate horizontal vent termination elbows are to be included in the equivalent vent length.

* This is the recommended maximum number of long sweep elbows for either 2 or 3 inch pipe. Combinations of long sweep 90s, standard 90s, or 45s may be used, but the manufacturer recommends the use of long sweep 90s whenever possible because the use of the maximum number of standard 90 and 45 elbows only may result in nuisance furnace outages due to individual installation specifics.

Exceeding the recommended maximum number of elbows may cause nuisance operation of the pressure switch.

** Not applicable for alternate terminations.
GENERAL VENTING REQUIREMENTS AND GUIDELINES

VENT PIPE SIZING AND MAXIMUM VENT LENGTHS (cont.)

POLYPROPYLENE VENT PRODUCTS

Centrotherm brand Innoflue and Duravent Polypro Single-wall and flex venting products are approved for use on this furnace product only in single appliance applications. Do not exceed maximum venting lengths, diameters or elbows listed in these instructions (Vent Pipe Sizing and Maximum Vent Lengths section [Table 4]). Application of these products is limited to the terminations listed in Tables 5 and 6 below. These manufacturers have provisions for B-vent liners and chimney liners which can be used with this furnace with non-direct venting applications only. Refer to the manufacturer’s installation instructions for proper installation. Contact the manufacturer for all installation and application information.

NOTE: These venting products are listed for use in Canada under ULC-S636.

**TABLE 5: DURAVENT BRAND POLYPRO & POLYPRO FLEX TERMINATION COMPONENTS**

<table>
<thead>
<tr>
<th>2&quot; VENT</th>
<th>3&quot; VENT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2PPS-HTP</td>
<td>3PPS-HTP</td>
<td>Horizontal Direct-Vent Termination</td>
</tr>
<tr>
<td>2PPS-HST</td>
<td>3PPS-HST</td>
<td>Horizontal Non-Direct Termination</td>
</tr>
<tr>
<td>2PPS-VK, 2PPS-VK-TC</td>
<td>3PPS-VK, 3PPS-VK-TC</td>
<td>Vertical Concentric Kits</td>
</tr>
<tr>
<td>2PPS-HK</td>
<td>3PPS-HK</td>
<td>Horizontal Concentric Kits</td>
</tr>
<tr>
<td>2PPS-FK</td>
<td>3PPS-FK</td>
<td>Flex Chimney Lining Kit</td>
</tr>
<tr>
<td>2PPS-VTT</td>
<td>3PPS-VTT</td>
<td>Vertical Flex Termination Cap</td>
</tr>
<tr>
<td>2PPS-BV4, 2PPS-BV5, 2PPS-BV6</td>
<td>3PPS-BV5, 3PPS-BV6</td>
<td>B-VENT Adapter</td>
</tr>
</tbody>
</table>

**TABLE 6: CENTROTHERM BRAND ECO SYSTEMS TERMINATION COMPONENTS**

<table>
<thead>
<tr>
<th>2&quot; VENT</th>
<th>3&quot; VENT</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISCPO2</td>
<td>ISCPO3</td>
<td>Chimney Cover</td>
<td>For Use on Non-Direct Vent only; DO NOT use with a Direct-Vent Installation.</td>
</tr>
<tr>
<td>NA</td>
<td>ISCM03</td>
<td>Stainless Steel Chimney Cover</td>
<td>For Use on Non-Direct Vent only; DO NOT use with a Direct-Vent Installation.</td>
</tr>
<tr>
<td>IABC0204 thru IABC0207</td>
<td>IABC0304 thru IABC0307</td>
<td>B-Vent Rain Collar</td>
<td>For Use on Non-Direct Vent only; DO NOT use with a Direct-Vent Installation.</td>
</tr>
<tr>
<td>ISLPT0202</td>
<td>ISLPT0303</td>
<td>Low-Profile Wall Termination</td>
<td></td>
</tr>
<tr>
<td>ISTT0220</td>
<td>ISTT0320</td>
<td>Termination Tee</td>
<td></td>
</tr>
<tr>
<td>ISEP02 &amp; ISEP0239</td>
<td>ISEP03 &amp; ISEP0339</td>
<td>End Pipe</td>
<td></td>
</tr>
<tr>
<td>IFEO2</td>
<td>NA</td>
<td>2&quot; Flex End Pipe</td>
<td>Approved for Direct-Vent</td>
</tr>
<tr>
<td>NA</td>
<td>ICWT352</td>
<td>Plastic Concentric Wall Termination</td>
<td>Approved for Direct-Vent</td>
</tr>
<tr>
<td>ICW2413</td>
<td>ICW3513</td>
<td>Stainless Steel Concentric Wall Termination</td>
<td>Approved for Direct-Vent</td>
</tr>
<tr>
<td>ICRT2439</td>
<td>ICRT3539</td>
<td>Concentric Roof (Vertical) Termination</td>
<td>Approved for Direct-Vent</td>
</tr>
</tbody>
</table>
VENT TERMINATIONS FOR BOTH NON-DIRECT AND DIRECT-VENT INSTALLATIONS MUST ADHERE TO GUIDELINES SPECIFIED BY THE LATEST EDITION OF ANSI Z21.47 GAS-FIRED CENTRAL FURNACES. THESE ARE CLEARLY DETAILED IN FIGURE 21 FOR NON-DIRECT-VENT INSTALLATIONS AND FIGURE 32 FOR DIRECT-VENT INSTALLATIONS. IN ADDITION TO THESE REQUIREMENTS, THE INSTALLATION AND VENTING MUST ALSO COMPLY WITH THE NATIONAL FUEL GAS CODE (U.S.) AND CSA-B149.1; CANADIAN NATURAL GAS AND PROPANE INSTALLATION CODE (CANADA) AND THE FOLLOWING REQUIREMENTS MUST ALSO BE MET:

NOTE: Screens of any kind on the inlet or exhaust pipes are not permitted and will void the manufacturer’s warranty.

In addition to the requirements shown in Figure 21 for Non-Direct venting and Figure 32 for Direct-Venting, the vent must be installed with the following minimum clearances:

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

2. Locate the furnace combustion air inlet a 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 multi-venting two or more furnaces, which is covered in the section on multiventing of these instructions.

In addition to the minimum clearances listed above and in Figure 21 (Non-Direct Vent) and Figure 32 (Direct-Vent), the vent location should also be governed by the following guidelines:

1. Avoid terminating under any kind of patio or deck. However, if necessary, vent piping may be installed under a deck as long as the termination(s) is (are) not under the deck.

2. If installing the vent under a deck, insulate it to insure that no condensate freezes and blocks the pipes.

3. Do not terminate in any area or behind any obstruction that may allow the flue products to become stagnant and/or re-circulate.

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

5. If extending vent through a brick or masonry surface, a sleeve between the wall and venting is suggested to protect against damage from thermal expansion and contraction.

6. A corrosion-resistant sheet metal or plastic backing plate installed on the wall behind the vent is suggested to prevent exhaust gases and condensate from contacting the wall.

7. Avoid locating too close to shrubs as condensate may stunt growth or kill them.
A WARNING

All furnace installations must comply with the National Fuel Gas Code, NFPA 54, and in Canada CSA B149.1; Canadian Natural Gas and Propane Installation Code, the National Fire Code of Canada, 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.

For improved indoor air quality, added safety and product performance we recommend direct vent type installations. If non-direct type vent system is used, the requirements for combustion air must be provided as identified in the National Fuel Gas Code and, in Canada, CSA B149.1; Canadian Natural Gas and Propane Installation Code.

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.

A WARNING

Read and follow the General Venting Requirements and Guidelines of this manual for additional venting requirements pertaining to all furnace installations (including direct and non-direct venting). Failure to follow all instructions in this manual can result in equipment failure, equipment damage, property damage, personal injury or death.

Confined and Unconfined Spaces

The below instructions are for U.S. installations only. The terms Confined Space and Unconfined Space refer to U.S. installations only. In Canada the proper term to use is Enclosure when specifying that a furnace is installed in a partially enclosed or fully enclosed room or space. For Canadian installations, to determine combustion air requirements for non-direct vent installations, the installer must follow CSA B149.1; Canadian Natural Gas and Propane Installation Code and NOT the below instructions.

### Table 7: Minimum Space Requirements for Unconfined Space, Non-Direct Vent

<table>
<thead>
<tr>
<th>Input (BTUH)</th>
<th>Minimum Space (Cubic Ft)</th>
<th>Minimum Area with 8ft Ceilings (sq ft)</th>
<th>Typical Room Size w/ 8' Ceilings (ft x ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42,000</td>
<td>2,100</td>
<td>263</td>
<td>14 x 20</td>
</tr>
<tr>
<td>56,000</td>
<td>2,800</td>
<td>350</td>
<td>18 x 20</td>
</tr>
<tr>
<td>70,000</td>
<td>3,500</td>
<td>438</td>
<td>22 x 20</td>
</tr>
<tr>
<td>84,000</td>
<td>4,200</td>
<td>525</td>
<td>25 x 20</td>
</tr>
<tr>
<td>98,000</td>
<td>4,900</td>
<td>613</td>
<td>20 x 30</td>
</tr>
<tr>
<td>112,000</td>
<td>5,600</td>
<td>700</td>
<td>25 x 30</td>
</tr>
</tbody>
</table>

Furnace Located in an Unconfined Space (U.S. Installations) Using Indoor Air for Combustion:

An unconfined space must have at least 50 cubic feet for each 1,000 BTUH of total input for all appliances in the space. Table 7 below specifies minimum space requirements and a few examples of the room sizes required for different inputs. The sizes are based on 8-foot ceilings.

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.

Furnace Located in a Confined Space (U.S. Installations)

A confined space is defined as any space for a given furnace input rating which is smaller than that which is specified in Table 7 as minimum for an “unconfined” space. If the space is less than that specified in this table, the space is defined as “confined”.

If the space is small enough that is designated as “confined”, it must have openings into the space which are located in accordance with the requirements set forth in the following subsections A and B. Size connected to the heated area or to the outside, and by the input of all appliances in the space.

If the confined space is within a building with tight construction, combustion air must be taken from outdoors or from an 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 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. Table 8 shows some typical examples of openings required for combustion air openings required for a confined space.

### Table 8: Minimum Free Area Opening Required for a Furnace Located in a Confined Space Using Indoor Air for Combustion.

<table>
<thead>
<tr>
<th>Input (BTUH)</th>
<th>Free Area for Each Opening (sq inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42,000</td>
<td>100</td>
</tr>
<tr>
<td>56,000</td>
<td>100</td>
</tr>
<tr>
<td>70,000</td>
<td>100</td>
</tr>
<tr>
<td>84,000</td>
<td>100</td>
</tr>
<tr>
<td>98,000</td>
<td>100</td>
</tr>
<tr>
<td>112,000</td>
<td>120</td>
</tr>
</tbody>
</table>
GENERAL VENTING REQUIREMENTS AND GUIDELINES

NON-DIRECT VENT (cont.)

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 below. 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.

METHOD 2:

A. Where directly communicating with the outdoors through an opening or where communicating to the outdoors through vertical ducts as shown in Figure 14, each opening shall have a minimum free area of 1 square inch for each 4,000 BTUH of total appliance input rating of all equipment in the enclosure. Table 9 below specifies the minimum area for each of the 2 combustion air openings and minimum round duct diameter for direct openings and vertical ducting only.

B. Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch for each 2,000 BTUH of total appliance input rating of all equipment in the enclosure (see Figure 15). Table 10 specifies the minimum area for each of the 2 combustion air openings and minimum round duct diameter for horizontal ducting only.

TABLE 9: MINIMUM FREE AREA REQUIRED FOR EACH OPENING (WHEN TWO OPENINGS ARE USED) WITH A FURNACE:

<table>
<thead>
<tr>
<th>Total Input for All Gas Appliances (BTUH)</th>
<th>Free Area for Each Opening when 2 Separate Openings are used (sq inches)</th>
<th>Round Pipe Duct Diameter (Vertical Duct Only) (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42,000</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>56,000</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>70,000</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>84,000</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>98,000</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>112,000</td>
<td>30</td>
<td>6</td>
</tr>
</tbody>
</table>

TABLE 10: MINIMUM FREE AREA REQUIRED FOR EACH OPENING (WHEN TWO OPENINGS ARE USED) WITH A FURNACE:

<table>
<thead>
<tr>
<th>Total Input for All Gas Appliances (BTUH)</th>
<th>Free Area for Each Opening when 2 Separate Openings are used (sq inches)</th>
<th>Round Pipe Duct Diameter (Horizontal Duct Only) (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42,000</td>
<td>21</td>
<td>6</td>
</tr>
<tr>
<td>56,000</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>70,000</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td>84,000</td>
<td>42</td>
<td>8</td>
</tr>
<tr>
<td>98,000</td>
<td>49</td>
<td>8</td>
</tr>
<tr>
<td>112,000</td>
<td>56</td>
<td>9</td>
</tr>
</tbody>
</table>

TABLE 11: MINIMUM FREE AREA REQUIRED FOR AN OPENING (WHEN ONE OPENING IS USED) WITH A FURNACE:

<table>
<thead>
<tr>
<th>Total Input for All Gas Appliances (BTUH)</th>
<th>Free Area for an Opening when 1 Opening is used (sq inches)</th>
<th>Round Pipe Duct Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42,000</td>
<td>21</td>
<td>6</td>
</tr>
<tr>
<td>56,000</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>70,000</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td>84,000</td>
<td>42</td>
<td>8</td>
</tr>
<tr>
<td>98,000</td>
<td>49</td>
<td>8</td>
</tr>
<tr>
<td>112,000</td>
<td>56</td>
<td>9</td>
</tr>
</tbody>
</table>
VENTING 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 of:

A. 1 Square inch for each 3,000 BTUH of the total input rating of all equipment located in the enclosure and
GENERAL VENTING REQUIREMENTS AND GUIDELINES

NON-DIRECT VENT (cont.)

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

If the unit is installed where there is an exhaust fan, sufficient ventilation must be provided to prevent the exhaust fan from creating negative pressure. Combustion air openings must not be restricted in any manner. Figure 16 shows allowable inlet air configurations for furnaces installed with non-direct vent.

IMPORTANT: When indoor combustion air is used, the inlet air opening at the furnace must be protected from accidental blockage (see Figure 16).

WARNING

DO NOT USE VENT TERMINATIONS WHICH ARE NOT SPECIFIED IN THESE INSTRUCTIONS. USING VENT TERMINATIONS OTHER THAN THOSE SPECIFIED HERE CAN RESULT IN ERRATIC OPERATION, EQUIPMENT FAILURE OR PERSONAL INJURY OR DEATH FROM CARBON MONOXIDE POISONING.

NON-DIRECT VENTING TERMINATIONS

These furnaces are design-certified to use a single vent pipe where all combustion air is taken from indoors and can be vented either vertically or horizontally.

CAUTION

ALL VENTS INSTALLED THROUGH UNCONDITIONED SPACE WHERE BELOW-FREEZING TEMPERATURES ARE EXPECTED SHOULD BE INSULATED WITH APPROVED INSULATION MATERIAL. MATERIAL SUCH AS ARMAFLEX OR RUBATEX INSULATION MAY ALSO BE USED AS LONG AS THERE IS NO HEAT TAPE IS APPLIED TO THE VENT PIPE. FAILURE TO INSULATE THE PIPE COULD RESULT IN FREEZING OF WATER IN THE PIPE THEREBY BLOCKING THE PIPE AND PREVENTING FURNACE OPERATION.

OPTION 1: VERTICAL TERMINATION

Figure 17 shows a standard non-direct vertical vent termination with clearances.

OPTION 2: STANDARD HORIZONTAL TERMINATION

Figure 18 shows the standard non-direct vent horizontal termination with minimum clearances.

FIGURE 17

VENT PENETRATIONS FOR NON-DIRECT VENT FURNACES

NOTE: 3” Ø pipe must be reduced to 2” Ø pipe before penetrating roof.

Maintain 12” (31cm) minimum clearance above highest anticipated snow level. For Canadian installations, terminations must conform to CSA B149.1-10, Sect. 8.14.

Terminations more than 24” above roof penetration require additional support.

FIGURE 18

VENT PENETRATIONS FOR NON-DIRECT VENT FURNACES

WALL PENETRATIONS

Install inner coupling slightly away from wall to allow for possible thermal expansion and contraction.

Couplings: Required on exterior, optional on interior.

12”/31cfm above grade or avg. anticipated snow level. For Canadian installations, terminations must conform to CSA B149.1-10, Sect. 8.14.
GENERAL VENTING REQUIREMENTS AND GUIDELINES

NON-DIRECT VENT (cont.)

OPTION 3: ALTERNATE HORIZONTAL TERMINATION

*Figure 19* shows the alternate non-direct vent horizontal termination with minimum clearances.

**FIGURE 19**
ALTERNATE HORIZONTAL NON-DIRECT VENT TERMINAL

VENT MAY BE ROTATED AS MUCH AS 45° LEFT OR RIGHT FROM VERTICAL AS LONG AS TIP PORTION REMAINS VERTICAL.

8" to 12" FROM WALL

TIP PORTION MUST REMAIN VERTICAL

45°

60" Max.

12'/31cm ABOVE GRADE OR AVG. ANTICIPATED SNOW LEVEL. FOR CANADIAN INSTALLATIONS, TERMINATIONS MUST CONFORM TO CSA B149.1-10, SECT. 8.14.

OPTION 4: RXGY-G02 SIDE WALL VENT TERMINATION

See *Figure 20* and refer to the **DIRECT VENT** Section, **OPTION 8: SIDEWALL VENT KIT** of this manual for information and directions on the side wall vent kit. The sidewall vent kit (RXGY-G02) can be used for both direct-vent and non-direct vent installations.

**FIGURE 20**
TYPICAL INSTALLATION – NON-DIRECT VENTING

FIELD SUPPLIED REDUCING COUPLING

3" Ø PIPE (RXGY-G02)

18'/46CM MAXIMUM OF 2" PIPE

2" Ø (RXGY-G02) OR 3" Ø (RXGY-G01) PIPE

MAINTAIN 12'/31cm FOR THE U.S. AS THE MINIMUM CLEARANCE ABOVE THE HIGHEST ANTICIPATED SNOW LEVEL OR GRADE WHICHEVER IS GREATER. IN CANADA TERMINATIONS MUST CONFORM TO CSA B149.1-10, SECT. 8.14.
**Figure 21** shows minimum clearances that must be used for non-direct venting terminations.

**GENERAL VENTING REQUIREMENTS AND GUIDELINES**

**NON-DIRECT VENT TERMINATION CLEARANCES**

Figure 21 shows minimum clearances that must be used for non-direct venting terminations.

---

**FIGURE 21**

**VENT TERMINATION CLEARANCES FOR NON-DIRECT VENT INSTALLATIONS**

<table>
<thead>
<tr>
<th>VENT TERMINAL</th>
<th>AIR SUPPLY INLET</th>
<th>AREA WHERE TERMINAL IS NOT PERMITTED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>Clearance above grade, veranda, porch, deck or balcony</td>
<td>12 inches (305mm) or 12 in. (305mm) above average snow accumulation.</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Clearance to window or door that may be opened</td>
<td>4 feet (1.2m) below or to side of opening; 1 foot (30cm) above opening</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Clearance to permanently closed window</td>
<td><em>12&quot; (30cm)</em></td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (0.6m) from the center line of the terminal</td>
<td><em>Equal to or greater than soffit depth</em></td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>Clearance to unventilated soffit</td>
<td><em>Equal to or greater than soffit depth</em></td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>Clearance to outside corner</td>
<td><em>No minimum to outside corner</em></td>
</tr>
<tr>
<td><strong>G</strong></td>
<td>Clearance to inside corner</td>
<td><em>3 ft. (9.1m), 10 ft. (3.05 m) preferred</em></td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>Clearance to each side of center line extended above meter/ regulator assembly</td>
<td>3 feet (9m) within a height 15 feet (4.5m) above the meter/ regulator assembly</td>
</tr>
<tr>
<td><strong>I</strong></td>
<td>Clearance to service regulator vent outlet</td>
<td>3 feet (9m)</td>
</tr>
<tr>
<td><strong>J</strong></td>
<td>Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance</td>
<td>4 feet (1.2m) below or to side of opening; 1 foot (30cm) above opening</td>
</tr>
<tr>
<td><strong>K</strong></td>
<td>Clearance to mechanical air supply inlet</td>
<td>3 feet (9m) above if within 10 feet (3m) horizontally</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>Clearance above paved sidewalk or paved driveway located on public property</td>
<td><em>7 feet (2.1m)</em></td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>Clearance under veranda, porch, deck or balcony</td>
<td><em>12 inches (305mm)</em></td>
</tr>
</tbody>
</table>

1 In accordance with the current ANSI Z223.1/ NFPA 54 Natural Gas Fuel Code
2 In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code

† A vent shall not terminate less than 7 ft. (2.1m) above a paved sidewalk or paved driveway that is located on public property.

☐ Permitted only if veranda, porch, deck or balcony is full open on a minimum of two sides beneath the floor. We recommend avoiding this location if possible.

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

ST-A1194-19 FIG A

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DIRECT VENT

**WARNING**

ALL FURNACE INSTALLATIONS MUST COMPLY WITH THE NATIONAL FUEL GAS CODE OR, IN CANADA, CSA B149.1: NATURAL GAS AND PROPANE INSTALLATION 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.

**WARNING**

READ AND FOLLOW THE GENERAL VENTING REQUIREMENTS AND GUIDELINES OF THIS MANUAL FOR ADDITIONAL VENTING REQUIREMENTS PERTAINING TO ALL FURNACE INSTALLATIONS (INCLUDING DIRECT AND NON-DIRECT VENTING). FAILURE TO FOLLOW ALL INSTRUCTIONS IN THIS MANUAL CAN RESULT IN EQUIPMENT FAILURE, EQUIPMENT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

**OPTION 1: STANDARD VERTICAL DIRECT-VENT TERMINATION**

*Figure 22* below shows a standard vertical termination for direct venting installations. Maintain the dimensions specified in this drawing for vertical venting of direct-vent furnace installations. Specific details of the roof penetration can be found in *Figure 23*.

**DIRECT-VENT (2-PIPE) INSTALLATIONS**

The field-supplied vent system used for direct-vent installations uses 2 pipes; one inlet pipe for supplying the combustion air to the furnace, and an exhaust (or flue) pipe for transferring the flue products to the outside. The flue pipe is elevated at least 12 inches above the air intake pipe for all vertical installations to prevent flue gas recirculation during operation.

The furnace combustion air inlet must be located a 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 of these instructions.

Direct-Vent systems must be installed so that the vent and combustion air intake pipes terminate in the same atmospheric pressure zone.

*FIG J*

SEE FIGURE 23 FOR MORE INFORMATION

**NOTE:** IF 3" Ø VENTING IS USED, BOTH PIPES (INTAKE AND EXHAUST) MUST BE REDUCED TO 2" Ø BEFORE PENETRATING THE ROOF.
**GENERAL VENTING REQUIREMENTS AND GUIDELINES**

**DIRECT VENT (cont.)**

*Figure 23* below shows the necessary detail for the roof penetration on a standard direct-vent vertical termination.

**Figure 23**

DIRECT VENT VERTICAL TERMINATION DETAIL

- **Combustion Air Termination**
- **Inlet Elevation**
- **Terminations more than 24” above roof penetration require additional support.**
- **Max. Average Anticipation Snow Level**
- **3” Vent = Reducer / Adapter**
- **2” Vent = Start of Termination and End Equiv. Vent Length**
- **3” (8 cm) minimum only if no snow accumulation is anticipated.**

**Termination Height Requirements**

- 36” max. (91 cm)
- 45” max. (114 cm)
- 48” max. (122 cm)
- 3” min. * (8 cm)
- 12” min. (31 cm)
- 15” min. (38 cm)

*NOTE: If 3” Ø venting is used, both pipes (intake and exhaust) must be reduced to 2” Ø before penetrating roof.*

**GENERAL VENTING REQUIREMENTS AND GUIDELINES**

**DIRECT VENT (cont.)**

*Figure 23* below shows the necessary detail for the roof penetration on a standard direct-vent vertical termination.

**Figure 23**

DIRECT VENT VERTICAL TERMINATION DETAIL

- **Combustion Air Termination**
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**Termination Height Requirements**

- 36” max. (91 cm)
- 45” max. (114 cm)
- 48” max. (122 cm)
- 3” min. * (8 cm)
- 12” min. (31 cm)
- 15” min. (38 cm)

*NOTE: If 3” Ø venting is used, both pipes (intake and exhaust) must be reduced to 2” Ø before penetrating roof.*
GENERAL VENTING REQUIREMENTS AND GUIDELINES

DIRECT VENT (cont.)

OPTION 2: STANDARD HORIZONTAL DIRECT-VENT TERMINATION

OPTION 3: VARIANT OF STANDARD HORIZONTAL DIRECT-VENT TERMINATION

WARNING: A TRAP MUST BE INSTALLED IN THIS OPTION TO PREVENT WATER FROM ENTERING THE FURNACE THROUGH THE COMBUSTION AIR PIPE. ORDER KITS RXG0505 FOR 2" PIPE OR RXG0506 FOR 3" PIPE AND INSTALL PER INSTRUCTIONS IN KIT.

NOTES:
1. A TRAP MUST BE INSTALLED IN THIS OPTION TO PREVENT WATER FROM ENTERING THE FURNACE THROUGH THE COMBUSTION AIR PIPE. ORDER KITS RXG0505 FOR 2" PIPE OR RXG0506 FOR 3" PIPE AND INSTALL PER INSTRUCTIONS IN KIT.
2. PIPING EXTERNAL TO THE STRUCTURE MUST BE INSULATED FOR LOCAL CLIMATE.
3. WALL PENETRATIONS AND VENT TERMINATIONS MUST BE WITH 2" Ø PIPE. WHEN USING 3" Ø VENT AND NECKING DOWN TO 2" Ø AS REQUIRED, A MAXIMUM OF 18" OF 2" Ø PIPE MAY BE USED INSIDE (BEFORE THE PENETRATION) WHEN USING 3" Ø VENT.
4. INTAKE: COUPLING REQUIRED
INTAKE 12" (31cm) FROM WALL

U.S. MIN. 12" (31cm) ABOVE GRADE, OR ANTICIPATED AVERAGE SNOW ACCUMULATION CANADA: TERMINATIONS MUST CONFORM TO CSA B149.1-10, SECT. 8.14.

NOTE: This detail applies to both terminations shown.

NOTE: This detail applies to the termination and NOT the penetration through the wall.

NOTE: This detail applies to the termination and NOT the penetration through the wall.

NOTE: This detail applies to the termination and NOT the penetration through the wall.

NOTE: This detail applies to the termination and NOT the penetration through the wall.
GENERAL VENTING REQUIREMENTS AND GUIDELINES

DIRECT VENT (cont.)

OPTION 4: ALTERNATE HORIZONTAL DIRECT-VENT TERMINATION

FIGURE 26
TYPICAL HORIZONTAL VENTED 2 PIPE TERMINALS

NOTE: 1) FOR EXHAUST / INTAKE PENETRATION DIMENSIONAL RELATIONSHIP SEE DETAIL C
2) WHEN 3” PIPE IS USED REDUCE TO 2” BEFORE PENETRATING OUTSIDE WALL.
3) WHEN USING 3” PIPE AND NECKING DOWN AS REQUIRED, A MAXIMUM OF 18” OF 2” PIPE MAY BE USED INSIDE WALL.
4) INCREASE THE 12” (31cm) MIN. ABOVE GRADE (U.S.) TO KEEP TERMINAL ABOVE GRADE OR ANTICIPATED AVG. HEIGHT

OPTION 5: VARIANT OF ALTERNATE HORIZONTAL DIRECT-VENT TERMINATION

FIGURE 27
VARIANT OF ALTERNATE HORIZONTAL DIRECT-VENT TERMINATION

NOTE: 1) A TRAP MUST BE INSTALLED IN THIS OPTION TO PREVENT WATER FROM ENTERING THE FURNACE THROUGH THE COMBUSTION AIR PIPE. ORDER KITS RXGY-005 FOR 2” PIPE OR RXGY-006 FOR 3” PIPE AND INSTALL PER INSTRUCTIONS IN KIT.
2) PIPING EXTERNAL TO THE STRUCTURE MUST BE INSULATED FOR LOCAL CLIMATES.
3) NO T’S CAN BE INSTALLED AT THE TERMINATION.
4) NO SCREENS MAY BE USED TO COVER COMBUSTION AIR OR EXHAUST.
5) THE COMBUSTION AIR TERMINATION MUST BE IN THE SAME PRESSURE ZONE AS THE EXHAUST TERMINATION.
6) THE EXHAUST TERMINATION MUST BE IN THE SAME PRESSURE ZONE AS THE COMBUSTION AIR TERMINATION.
7) NO SCREENS MAY BE USED TO COVER COMBUSTION AIR OR EXHAUST.
8) NO T’S CAN BE INSTALLED AT THE TERMINATION.
9) DETAIL A INSTALL WIND DEFLECTOR VANE IN 2” PVC COUPLING IN VERTICAL OPENINGS ABOVE ANTICIPATED LEVEL OF SNOW ACCUMULATION WHERE APPLICABLE. CANADA: REFER TO B149.1, SECT. 8.14.
10) DETAIL A INSTALL WIND DEFLECTOR VANE IN 2” PVC COUPLING IN VERTICAL OPENINGS ABOVE ANTICIPATED LEVEL OF SNOW ACCUMULATION WHERE APPLICABLE. CANADA: REFER TO B149.1, SECT. 8.14.

NOTES:
1) SUPPORT HORIZONTAL PIPE EVERY FOUR FEET.
2) WHEN 3” PIPE IS USED REDUCE TO 2” BEFORE PENETRATING OUTSIDE WALL.
3) WHEN USING 3” PIPE AND NECKING DOWN AS REQUIRED, A MAXIMUM OF 18” OF 2” PIPE MAY BE USED INSIDE WALL.
4) INCREASE THE 12” (31cm) MIN. ABOVE GRADE (U.S.) TO KEEP TERMINAL ABOVE GRADE OR ANTICIPATED AVG. HEIGHT

ST-A1194-18-XO FIGURES M, L, & N & P & OPT B & C.

OPTION A ONLY

NOTE: 1) A TRAP MUST BE INSTALLED IN THIS OPTION TO PREVENT WATER FROM ENTERING THE FURNACE THROUGH THE COMBUSTION AIR PIPE. ORDER KITS RXGY-005 FOR 2” PIPE OR RXGY-006 FOR 3” PIPE AND INSTALL PER INSTRUCTIONS IN KIT.
2) PIPING EXTERNAL TO THE STRUCTURE MUST BE INSULATED FOR LOCAL CLIMATES.
3) WALL PENETRATION AND VENT TERMINATIONS MUST BE WITH 2” (5cm) PIPE.
4) INCREASE THE 12” (31cm) MIN. ABOVE GRADE (U.S.) TO KEEP TERMINAL ABOVE GRADE OR ANTICIPATED AVG. HEIGHT

OPTION B ONLY

NOTE: A TRAP IN THE COMBUSTION AIR PIPE IS NOT REQUIRED FOR THIS OPTION.
2) PIPING EXTERNAL TO THE STRUCTURE MUST BE INSULATED FOR LOCAL CLIMATES.
3) WALL PENETRATION AND VENT TERMINATIONS MUST BE WITH 2” (5cm) PIPE.
4) INCREASE THE 12” (31cm) MIN. ABOVE GRADE (U.S.) TO KEEP TERMINAL ABOVE GRADE OR ANTICIPATED AVG. HEIGHT

ST-A1194-18-XO FIGURES M, L, & N & P & OPT B & C.
OPTIONAL TERMINATION ANGLES FOR OPTION FOR ALT. HORIZ. AND VARIANT OF ALT. HORIZ. DIRECT-VENT TERMINATIONS (OPTIONS 4 & 5)

NOTE: THESE OPTIONAL TERMINATION ANGLES APPLY ONLY TO DIRECT-VENT TERMINATION OPTIONS 4 AND 5 ABOVE (ALTERNATE HORIZONTAL AND VARIANT OF OPTIONAL HORIZONTAL) IN THIS SECTION. DO NOT USE THESE ANGLED TERMINATIONS WITH ANY OTHER TERMINATION OPTION.

NOTE: This option is recommended for installations where the distance from the vent pipe perpendicular to another structure is less than 10 feet.

TOP VIEW FOR USING 22° OR 45° TERMINATION ON A SINGLE FURNACE

USING ALTERNATE VENT TERMINATIONS FROM OPTIONS 4 OR 5 ABOVE, SIMPLY ROTATE THE FINAL ELBOWS 22 OR 45 DEGREES FROM THE WALL AS SHOWN ABOVE.

1. BOTH THE COMBUSTION AIR AND EXHAUST FINAL TERMINATION ELBOWS MUST BE AT THE SAME ANGLE AND FACE THE SAME DIRECTION (LEFT OR RIGHT).

2. A WIND VANE MUST BE INSTALLED IN THE COMBUSTION AIR INLET PIPE AS SHOWN IN THE DIAGRAM.

3. NUMBER AND DISTANCE BETWEEN (RECOMMENDED) SUPPORT STRAPS MUST PROVIDE RIGID SUPPORT.

4. MARK THE FINAL (22° OR 45°) ANGLES ON THE TOP OF THE VERTICAL RISERS AND FINAL ELBOWS BEFORE GLUING INTO PLACE TO ENSURE THAT THE FINAL ANGLES ARE CORRECT.

5. INSULATING THE EXHAUST TERMINATION VERTICAL RISER MAY BE NECESSARY IN SOME AREAS, DEPENDING ON THE TOTAL LENGTH AND EXPECTED TEMPERATURES IN THE AREA.

6. DO NOT ANGLE (22° OR 45°) INTO AN INSIDE CORNER.

7. DO NOT USE SCREENS ON THE INLET OR EXHAUST PIPES.

8. ANGLED TERMINATIONS CANNOT BE USED ON PAIRS OF VENTS.

9. THIS TERMINATION MAY CAUSE DISCOLORATION OVER TIME TO THE EXTERNAL SURFACE OF THE STRUCTURE.

10. WALL PENETRATIONS AND VENT TERMINATIONS MUST BE WITH 2” PIPE TO REDUCE THE POSSIBILITY OF ICE FORMING AT THE TERMINATION. A MAXIMUM OF 18” OF 2” PIPE IS PERMITTED INSIDE (BEFORE THE PENETRATION) WHEN USING 3” VENT.
GENERAL VENTING REQUIREMENTS AND GUIDELINES

DIRECT VENT (cont.)

OPTIONS 6 & 7: VERTICAL OR HORIZONTAL CONCENTRIC VENT TERMINATION
FOR 2” PIPE: RXGY-E02 (U.S. ONLY) OR RXGY-E02A (U.S. AND CANADA)
FOR 3” PIPE: RXGY-E03 (U.S. ONLY) OR RXGY-E03A (U.S. AND CANADA)

CONCENTRIC TERMINATIONS
These kits are for vertical/horizontal intake air/vent runs and may be installed through roofs or sidewalls. One 5 inch diameter hole (RXGY-E03 & RXGY-E03A) or 3-5/8 inch diameter hole (RXGY-E02 & RXGY-E02A) is required for the installation. See Figure 29 for the general layout. Complete instructions are included with each kit.

NOTE: The following IPEX brand concentric vent termination (System 636) may be purchased in the field and used in place of the kits offered by the furnace manufacturer.

3” Concentric Vent Kit = Item #196006

NOTE: Maximum equivalent lengths specified in the VENT PIPE SIZING AND MAXIMUM VENT LENGTHS section of this manual are in addition to the concentric vent.

NOTE: With this option a trap on the inlet air pipe is NOT required.
GENERAL VENTING REQUIREMENTS AND GUIDELINES

DIRECT VENT (cont.)

OPTIONS 8 & 9: 2" & 3" SIDE WALL VENT TERMINATIONS
FOR 2" PIPE: RXGY-G02
FOR 3" PIPE: RXGY-G01

This termination is for horizontal venting only. This termination may be installed with either a non-direct-vent or a direct-vent system. When installed as non-direct vent, only one wall penetration is necessary for the exhaust vent.

IMPORTANT: Do not install on the prevailing winter wind side of the structure.

IMPORTANT: Maintain a minimum of 12 inches (U.S.) above grade or the highest anticipated average snow level (whichever is greater) to the bottom of the vent cover or, in Canada, terminations must conform with CSA B149.1-10, Sect. 8.14, Canadian Natural Gas and Propane Installation Code.

NOTE: Dimensions between the inlet and outlet pipes (direct-vent only) are fixed by the sidewall termination. Other drawings in this manual which specify minimum and/or maximum distances (vertical and horizontal) between pipes do not apply to the sidewall termination kit.

NOTE: Multiventing – NO COMMON VENTING IS PERMITTED WITH THIS KIT.

NOTE: With this option a trap on the inlet combustion air pipe is NOT required.

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 the wall. DO NOT INSTALL VENT KITS ONE ABOVE THE OTHER to prevent the possibility of condensate freeze-up or recirculation.

NOTE: Vent should protrude a maximum of 2-1/4 inches beyond the vent plate. Air intake should protrude a maximum of 1 inch beyond the vent plate.

NOTE: The RXGY-G02 termination can be used with 3" vent pipe. A maximum of 18" of 2" pipe can be used before penetrating the wall.

Complete installation instructions are included with these kits.
Figure 32 shows minimum clearances that must be used for direct venting terminations.

### GENERAL VENTING REQUIREMENTS AND GUIDELINES

#### DIRECT VENT TERMINATION CLEARANCES

**Figure 32** DIRECT VENT TERMINAL CLEARANCES

<table>
<thead>
<tr>
<th></th>
<th>US Installations</th>
<th>Canadian Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clearance above grade, veranda, porch, deck or balcony</td>
<td>12 inches (305mm) or 12 in. 305mm above average snow accumulation.</td>
</tr>
<tr>
<td>B</td>
<td>Clearance to window or door that may be opened</td>
<td>6 inches (152mm) for appliances&lt;10,000 Btu/h (3kw), 12 inches (305mm) for appliances &gt;10,000 Btu/h (3kw) and&lt;100,000 Btu/h (30kw), 36 inches (914mm) for appliances &gt;10,000 Btu/h (3kw) and&lt;100,000 Btu/h (30kw), 36 inches (914mm) for appliances &gt;10,000 Btu/h (3kw) and&lt;100,000 Btu/h (30kw)</td>
</tr>
<tr>
<td>C</td>
<td>Clearance to permanently closed window</td>
<td>*12&quot; (30cm)</td>
</tr>
<tr>
<td>D</td>
<td>Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (0.6m) from the center line of the terminal</td>
<td>*Equal to or greater than soffit depth</td>
</tr>
<tr>
<td>E</td>
<td>Clearance to unventilated soffit</td>
<td>*Equal to or greater than soffit depth</td>
</tr>
<tr>
<td>F</td>
<td>Clearance to outside corner</td>
<td>*No minimum to outside corner</td>
</tr>
<tr>
<td>G</td>
<td>Clearance to inside corner</td>
<td>*3 ft. (914mm), 10 ft. (3.05m) preferred</td>
</tr>
<tr>
<td>H</td>
<td>Clearance to each side of center line extended above meter / regulator assembly</td>
<td>3 feet (914mm) within a height 15 feet (4.5m) above the meter / regulator assembly</td>
</tr>
<tr>
<td>I</td>
<td>Clearance to service regulator vent outlet</td>
<td>3 feet (914mm)</td>
</tr>
<tr>
<td>J</td>
<td>Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance</td>
<td>6 inches (152mm) for appliances&lt;10,000 Btu/h (3kw), 12 inches (305mm) for appliances &gt;10,000 Btu/h (3kw) and&lt;100,000 Btu/h (30kw), 36 inches (914mm) for appliances &gt;10,000 Btu/h (3kw) and&lt;100,000 Btu/h (30kw), 36 inches (914mm) for appliances &gt;10,000 Btu/h (3kw) and&lt;100,000 Btu/h (30kw)</td>
</tr>
<tr>
<td>K</td>
<td>Clearance to mechanical air supply inlet</td>
<td>3 feet (914mm) above if within 10 feet (3m) horizontally</td>
</tr>
<tr>
<td>L</td>
<td>Clearance above paved sidewalk or paved driveway located on public property</td>
<td>*7 feet (2.1m)</td>
</tr>
<tr>
<td>M</td>
<td>Clearance under veranda, porch, deck or balcony</td>
<td>*12 inches (305mm)</td>
</tr>
</tbody>
</table>

1 In accordance with the current ANSI Z223.1/NFPA 54 Natural Fuel Gas Code
2 In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code
3 Vent shall not terminate less than 7 ft. (2.1m) above a paved sidewalk or paved driveway that is located on public property.
4 Permitted only if veranda, porch, deck or balcony is full open on a minimum of two sides beneath the floor. We recommend avoiding this location if possible.

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

MULTIVENTING OF DIRECT-VENT FURNACES

Figures 33 & 34: Note: When venting multiple furnaces in close proximity, each furnace must be individually vented – no common venting is permitted. See Figures 33 & 34 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 and etc. Figure 33, (Detail A) below shows the necessary detail for the roof penetration on a standard direct-vent vertical termination.

**Figure 33**

**TWO FURNACE VENTING**

Terminations more than 24" above roof penetration require additional support.

Terminations must be greater than 8" apart.

Terminations must be less than 24" apart or greater than 36" apart.

Each additional termination must be greater than 48" from the previous termination.

**Figure 34**

**TWO FURNACE VENTING WITH CONCENTRIC VENTING**

Concentric venting through roof.

Concentric venting through wall.

Two pipe venting through roof.

Two pipe venting through wall.

Direct vent vertical termination detail

**Detail A**
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 located below the furnace. A blocked or restricted drain line can result in overflow of the coil pan and negate the furnace blocked drain shutoff control.

The condensate drain trap is self-priming. Upon the first heat attempt after installation or the first ignition after a long off period (e.g. summer), the trap will be dry allowing air to pull through the trap and causing the condensate to be held in the collector box by the negative pressure while the inducer is energized.

Condensate builds up in the collector box until the level reaches the electronic water level sensor. When this happens the heat attempt is ended thus shutting off the inducer after a post purge. This relieves the negative pressure pulled through the trap and the water then falls into the trap generally priming it after the first time. Note that in some circumstances this process may be repeated up to four times before the trap is fully primed – particularly in horizontal installations where there is less volume of water in the collector box below the water level sensor.

IMPORTANT: There are two options when choosing a height for the condensate vent riser (also see Figure 35):

A. CONDENSATE OVERFLOW – When the top of the vent tube is below the elevation of the LOWER condensate water level sensor (aka electronic water level sensor) the furnace will continue to run even if the drain is blocked. A blocked drain will cause the condensate water to overflow the vent and spill water on the floor below it but the furnace will continue to run and heat will be provided. If the installer uses this approach, he must make sure that there is a mechanism for handling the possibility of water overflow onto the floor in the event of a blocked drain.

B. FURNACE SHUTOFF – When the top of the vent tube is above the elevation of the LOWER condensate water level sensor (aka electronic water level sensor), the furnace will be shut off in the event of a blocked drain and no heat will be provided.

NOTE: IT IS IMPORTANT ANY TIME THE FURNACE IS INSTALLED IN AN ENVIRONMENT WHERE THE TEMPERATURE CAN GET BELOW FREEZING THAT THE TRAP AND ALL CONDENSATE LINE BE PROTECTED FROM FREEZING. IF THE FURNACE IS EXPOSED TO TEMPERATURES BELOW FREEZING, THE TRAP WILL FREEZE AND THIS WILL CAUSE THE FURNACE TO SHUT DOWN AND/OR DAMAGE THE DRAIN TRAP UNLESS FREEZE PROTECTION IS INSTALLED.

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 Figure 35.

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.

NOTE: IT IS IMPORTANT ANY TIME THE FURNACE IS INSTALLED IN AN ENVIRONMENT WHERE THE TEMPERATURE CAN GET BELOW FREEZING THAT THE TRAP AND ALL CONDENSATE LINE BE PROTECTED FROM FREEZING. IF THE FURNACE IS EXPOSED TO TEMPERATURES BELOW FREEZING, THE TRAP WILL FREEZE AND THIS WILL CAUSE THE FURNACE TO SHUT DOWN AND/OR DAMAGE THE DRAIN TRAP UNLESS FREEZE PROTECTION IS INSTALLED.
CONDENSATE DRAIN

CONDENSATE DRAIN & DRAIN NEUTRALIZER (cont.)

**Figure 35**

**HEIGHT: OPTION “B”**

**HEIGHT: OPTION “A”**

**HEIGHT OF LOWER CONDENSATE DRAIN SENSOR**

- **CONDENSATE TRAP**
- **DRAIN LINE**
- **NEUTRALIZER CARTRIDGE** (OPTIONAL)
- **OVERFLOW LINE** (REQUIRED ONLY WHEN OPTIONAL NEUTRALIZER CARTRIDGE IS USED)
- **TO FLOOR DRAIN**
- **OR**
- **CONDENSATE PUMP**

**NOTE:**

THESE IMAGES INTENTIONALLY DEPICT GENERIC VIEWS OF THE DRAIN ROUTING, THE INSTALLER HAS THE OPTION TO ROUTE THE DRAIN TO THE RIGHT OR LEFT SIDE OF THE FURNACE AS NEEDED.

**VENT TUBE HEIGHT**

Vent tube height is optional:

**Option A:** Install vent tube height with top of the tube above the level of the lower condensate water sensor. This option will not spill water from the drain vent but the furnace will also not continue to run with a blocked drain.

**Option B:** Install vent tube height with top of the tube below the level of the water sensor to allow the furnace to run when the drain is blocked. This option will spill water out of the tube when the drain is blocked.

**VENT TUBE HEIGHT**

**HEIGHT: OPTION “B”**

**HEIGHT: OPTION “A”**

**HEIGHT OF LOWER CONDENSATE DRAIN SENSOR**

- **CONDENSATE TRAP**
- **DRAIN LINE**
- **NEUTRALIZER CARTRIDGE** (OPTIONAL)
- **OVERFLOW LINE** (REQUIRED ONLY WHEN OPTIONAL NEUTRALIZER CARTRIDGE IS USED)
- **TO FLOOR DRAIN**
- **OR**
- **CONDENSATE PUMP**

**CONDENSATE DRAIN LOCATING INSTRUCTIONS**

**CONDENSATE DRAIN**

**ST-A1194-4**

**ST-A1194-42-X0**

**condensate drain**
Gas Supply

GAS SUPPLY AND PIPING

IMPORTANT SAFETY INFORMATION

NATURAL GAS AND PROPANE (LIQUEFIED PETROLEUM GAS / LPG) SAFETY

GAS SUPPLY

⚠️ WARNING

• Furnaces using propane gas are different from natural gas models. A natural gas heater will not function safely on propane and vice versa. Conversions of heater gas type should only be made by qualified installers using factory supplied components. The furnace should only use the fuel type in accordance with listing on rating plate. Any other fuel usage will result in death or serious personal injury from fire and/or explosion.

• Both natural gas and propane have an odorant added to aid in detecting a gas leak. Some people may not physically be able to smell or recognize this odorant. If you are unsure or unfamiliar with the smell of natural gas or propane, ask your local gas supplier. Other conditions, such as "odorant fade," which causes the odorant to diminish in intensity, can also hide, camouflage, or otherwise make detecting a gas leak by smell more difficult.

• UL or CSA recognized fuel gas detectors are recommended in all enclosed propane and natural gas applications where there is a potential for an explosive mixture of fuel gas to accumulate. Fuel detector installation should be in accordance with the detector manufacturer’s recommendations and/or local laws, rules, regulations, or customs.

• Before attempting to light the furnace, make sure to look and smell for gas leaks. Use a soapy solution to check all gas fittings and connections. Bubbling at a connection indicates a leak that must be corrected. When smelling to detect a gas leak, be sure to also sniff near the floor. Propane gas is heavier than air and tends to collect at lower levels making it more difficult to smell at nose level. Natural gas is lighter than air and will rise, possibly accumulating in higher portions of the structure.

• If a gas leak is present or suspected:
  - Do not attempt to find the cause yourself.
  - Never use an open flame to test for gas leaks. The gas can ignite resulting in death, personal injury, or property damage.
  - Do not try to light any appliance.
  - Do not touch and electrical switch.
  - Do not use any phone in your building.
  - Leave the building immediately and call the 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 the building until authorized by the gas supplier or fire department.

• Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the furnace.

• Consult with the local building department and fuel gas supplier before installing the heater:
  - LP furnaces should not be installed below grade (in a basement for example) if such installation is prohibited by federal, state, provincial, and/or local laws, rules, regulations, or customs.
  - Installation of a gas pressure regulator may be required in the gas supply line. The regulator should not exceed the maximum supply pressure listed on the furnace rating plate. Do not use an industrial-type gas regulator.
  - Follow all local codes and section 8.3 of NFGC with regard to purging of gas piping to ensure that the air and/or fuel gas in the gas piping is properly vented to a location where an explosive mixture cannot accumulate.

(Continued on next column)
GAS SUPPLY

GAS PIPING

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 or commercial fuel provider.

IMPORTANT: U.L. or CSA recognized fuel gas and carbon monoxide (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.

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 12 for natural gas (Table 13 for LP gas) for the recommended gas pipe size. See Figure 36 for typical gas pipe connections.

Install a ground joint union within 3 feet of the cabinet to easily remove the gas valve assembly. Local codes may dictate the location of the ground joint union. Install a manual shut-off valve in the gas line outside of the furnace casing and upstream of the ground joint union. The manual shut-off valve should be readily accessible to turn the gas 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.

(CONTINUED ON NEXT PAGE)
GAS PIPING

FIGURE 36 – continued
GAS PIPING INSTALLATION

DOWNFLOW

CONVENTIONAL

ALTERNATE

(continued on next page)
GAS PRESSURE

**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 is not to 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).

*Natural gas supply pressure must be 5” to 10.5” w.c.*

*LP gas supply pressure must 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 RECALCULATED 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.**

**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 Figure 37.

When energized, it takes 2 to 3 seconds to fully open.

---

**TABLE 12**

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

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

<table>
<thead>
<tr>
<th>Nominal Size, Inches</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>132</td>
<td>92</td>
<td>74</td>
<td>63</td>
<td>56</td>
<td>50</td>
<td>46</td>
<td>43</td>
</tr>
<tr>
<td>3/4</td>
<td>278</td>
<td>190</td>
<td>152</td>
<td>130</td>
<td>115</td>
<td>105</td>
<td>96</td>
<td>90</td>
</tr>
<tr>
<td>1</td>
<td>520</td>
<td>350</td>
<td>285</td>
<td>245</td>
<td>215</td>
<td>196</td>
<td>180</td>
<td>170</td>
</tr>
<tr>
<td>1-1/4</td>
<td>1,050</td>
<td>730</td>
<td>590</td>
<td>500</td>
<td>440</td>
<td>400</td>
<td>370</td>
<td>350</td>
</tr>
<tr>
<td>1-1/2</td>
<td>1,600</td>
<td>1,100</td>
<td>890</td>
<td>760</td>
<td>670</td>
<td>610</td>
<td>560</td>
<td>530</td>
</tr>
</tbody>
</table>

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

Cu. Ft. Per Hr. Required = Gas Input of Furnace (BTU/HR) / Heating value of gas (BTU/FT³)

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT³) may be determined by consulting the local natural gas utility or the LP gas supplier.*
NOTE: See Page 82 for Canadian High-Altitude Derate.

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

NOTE: Order the correct LP conversion kit from the furnace manufacturer. 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 4% per thousand ft. and the orifice size must be selected based on the reduced input selection chart in High Alt. Instruction Section.

To change orifice spuds for either conversion to LP or for elevation:

1. Shut off the manual main gas valve and remove the gas manifold.
2. Replace the orifice spuds.
3. Reassemble in reverse order.
4. Turn the gas supply back on and check for proper operation and manifold pressure.
5. Attach the notice label alerting the next service technician that the furnace has been converted to LP gas.

LP CONVERSION

WARNING

LP TANKS FROM LOCAL LP SUPPLIER MUST NOT BE USED TO STORE ANYTHING (SUCH AS FERTILIZER) EXCEPT LP GAS. THIS INCLUDES ALL DELIVERY VESSELS (LP TRUCKS). IF MATERIAL OTHER THAN LP GAS IS USED IN THE SAME VESSELS/TANK AS THE LP GAS, THE LP GAS CAN BECOME CONTAMINATED AND DAMAGE THE FURNACE. THIS WILL VOID THE MANUFACTURER’S WARRANTY. CONTACT THE SUPPLIER TO MAKE SURE FERTILIZER IS NOT USED IN THE SAME TANKS USED TO STORE AND DELIVER LP GAS.

FIGURE 38
TYPICAL LP KIT CONTENTS

TABLE 13
LP GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure).
(Based on a Pressure Drop of 0.5 Inch Water Column)

<table>
<thead>
<tr>
<th>Nominal Iron Pipe Size, Inches</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>125</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>275</td>
<td>189</td>
<td>152</td>
<td>129</td>
<td>114</td>
<td>103</td>
<td>96</td>
<td>89</td>
<td>83</td>
<td>78</td>
<td>69</td>
<td>63</td>
</tr>
<tr>
<td>3/4</td>
<td>567</td>
<td>393</td>
<td>315</td>
<td>267</td>
<td>237</td>
<td>217</td>
<td>196</td>
<td>182</td>
<td>173</td>
<td>162</td>
<td>146</td>
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</tr>
<tr>
<td>1</td>
<td>1,071</td>
<td>732</td>
<td>590</td>
<td>504</td>
<td>448</td>
<td>409</td>
<td>378</td>
<td>346</td>
<td>322</td>
<td>307</td>
<td>275</td>
<td>252</td>
</tr>
<tr>
<td>1-1/4</td>
<td>2,205</td>
<td>1,496</td>
<td>1,212</td>
<td>1,039</td>
<td>913</td>
<td>834</td>
<td>771</td>
<td>724</td>
<td>677</td>
<td>630</td>
<td>567</td>
<td>511</td>
</tr>
<tr>
<td>1-1/2</td>
<td>3,307</td>
<td>2,299</td>
<td>1,858</td>
<td>1,559</td>
<td>1,417</td>
<td>1,275</td>
<td>1,181</td>
<td>1,086</td>
<td>1,023</td>
<td>976</td>
<td>886</td>
<td>787</td>
</tr>
<tr>
<td>2</td>
<td>6,221</td>
<td>4,331</td>
<td>3,465</td>
<td>2,992</td>
<td>2,846</td>
<td>2,684</td>
<td>2,525</td>
<td>2,407</td>
<td>2,047</td>
<td>1,921</td>
<td>1,811</td>
<td>1,606</td>
</tr>
</tbody>
</table>

Example (LP): Input BTU requirement of unit, 120,000
Equivalent length of pipe, 60 ft. = 3/4” IPS required.
SETTING GAS PRESSURE
The maximum gas supply pressure to the furnace must not exceed 10.5" w.c. natural gas, or 13" w.c. LP gas. The minimum supply gas pressure to the gas valve should be 5" w.c. natural gas or 11" w.c. LP gas. A properly calibrated manometer is required for accurate gas pressure measurements.

SUPPLY GAS PRESSURE MEASUREMENT
An inlet pressure tap is on the input side of the gas valve.
1. With gas shut off to the furnace at the manual gas valve outside the unit.
2. Loosen (do NOT remove) the inlet pressure tap using a 3/32" allen-head wrench (see Figure 37).
3. Connect a manometer to the pressure tap. The pressure tap requires a 5/16" I.D. hose.
   A kit is available from Prostock Replacement Parts which includes the following:
   A. 3/32" allen-head wrench
   B. 5/16" to 1/4" I.D. hose reducer fitting
   C. Short piece of 5/16" I.D. hose
   Kit part number is: F0092-100300S1
4. Turn on the gas supply and operate the furnace and all other gas-fired units on the same gas line as the furnace.
5. Note or adjust the line gas pressure to give:
   A. 5" - 10.5" w.c. for natural gas.
   B. 11" - 13" w.c. for LP gas.
6. Shut off the gas at the manual gas valve and remove the manometer and hose.
7. Tighten the allen-head screw in the inlet pressure tap using a 3/32" allen-head wrench (see Figure 37) and replace the pressure tap plug before turning on the gas.
8. Turn on the gas supply and check for leaks using an approved leak detector. Do NOT use a flame of any kind to check for leaks. Repair any leaks and repeat.
If the supply gas line pressure is above these ranges, install an in-line gas regulator to the furnace for natural gas units. With LP gas, have the LP supplier reduce the line pressure at the regulator.
If supply gas line pressure is below these ranges, either remove any restrictions in the gas supply piping or enlarge the gas pipe. See Tables 12 and 13. With LP gas, have the LP supplier adjust the line pressure at the regulator.

CAUTION
ELEVATIONS ABOVE 2000 FT. REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RECALCULATED 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.

Manifold Gas Pressure Measurement. Natural gas manifold pressure should be 3.5" w.c. for high fire and 1.8" w.c. for low fire. LP gas manifold pressure should be 10.0" w.c. for high fire and 4.9" w.c. for low fire. Only small variations in gas pressure should be made by adjusting the pressure regulator.
1. With the gas to the unit shut off at the manual gas valve, remove the outlet pressure tap plug.
2. Loosen (do NOT remove) the outlet pressure tap plug using a 3/32" allen-head wrench (see Figure 37).
3. Connect a manometer to the pressure tap. The pressure tap requires a 5/16" I.D. hose.
   A kit is available from Prostock Replacement Parts which includes the following:
   A. 3/32" allen-head wrench
   B. 5/16" to 1/4" I.D. hose reducer fitting
   C. Short piece of 5/16" I.D. hose
   Kit part number is: F0092-100300S1
4. Turn on the gas supply and apply a heat call.
5. Note or adjust the manifold gas pressure to give:
   A. 3.5" w.c. for natural gas.
   B. 10.0" w.c. for LP gas.
6. To adjust the pressure regulators, remove the regulator caps. (See Figure 37.)
7. Turn the adjustment screw clockwise to increase pressure, or counterclockwise to decrease pressure.
8. Securely replace the regulator caps.
9. Shut off gas at the manual gas valve and remove the manometer and hose.
10. Tighten the allen-head screw in the inlet pressure tap using a 3/32" allen-head wrench (see Figure 37).
11. Turn on the gas supply and apply a heat call to the furnace. Then check for gas leaks using an approved leak detector. Do NOT use a flame of any kind to check for leaks. Repair any leaks and repeat.
ELECTRICAL WIRING

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. Run this circuit directly from the main switch box to an electrical disconnect that is readily accessible and located near the furnace (as required by code). 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: 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 L2 (neutral) polarity must be observed when making field connections to the furnace. The ignition control may not sense flame if L1 and L2 are reversed. Make all electrical connections in accordance with the latest edition of the National Electrical Code;

ANSI/NFPA70 or, in Canada, The Canadian Electrical Code and local codes having jurisdiction. These may be obtained from:
National Fire Protection Association, Inc.
Battery Park
Quincy, MA 02269

REVERSING THE ELECTRICAL CONNECTION (JUNCTION BOX)

If the line voltage electrical needs to be moved to the opposite side of the furnace, the following steps should be taken:

1. The furnace must NOT be electrically connected to line voltage prior to reversing the electrical connection.
2. Disconnect the wires from the door switch.
3. Remove the junction box from the furnace cabinet wall by removing the two screws that hold it to the cabinet. Leave the wires connected to the junction box.
4. Remove 7/8" plug from hole opposite j-box location. Drill 2 @ 3/16" Ø holes in the jacket. NOTE: Dimples/marks are provided in the sheet metal for correct drilling location.
5. Move the junction box to the opposite side of the cabinet. Install using the two screws removed in step 3 above. Note that all screws penetrating the junction box must be blunt – no sharp tipped screws can be used.

6. Replace the plug from the opposite of the furnace (the new j-box location) to the old j-box location and install qty=2 1/4" plugs from parts bag in empty screw holes in old location of j-box into the mounting screw holes in the old junction box location.

7. Using a flat screwdriver, squeeze the retaining arms on the door switch and gently pry the door switch from it’s opening as shown in Figure 39.

8. Install the door switch in the same opening on the opposite of the furnace and reconnect the electrical connectors (removed in Step 2) to the door switch.

**THERMOSTAT**

The room thermostat must be compatible with the furnace. See manufacturer’s thermostat spec sheet for compatibility concerns. Generally, all thermostats that are not of the “current robbing” type are compatible with the integrated furnace control. The low voltage wiring should be sized as shown.

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

Install the room thermostat in accordance with the instruction sheet packed in the box with the thermostat. Run the thermostat lead wires inside the blower compartment and connect to low voltage terminals 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 or ducts, lighting fixtures, radiation from fireplace, sun rays, lamps, televisions, radios or air streams from registers.

**FIGURE 40**
ISOLATION RELAY

**FIGURE 41**
LINE VOLTAGE CONNECTIONS
ACCESSORIES

FIELD INSTALLED OPTION ACCESSORIES

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

NOTE: The electronic air cleaner output will not be energized when the ECM blower motor target CFM is below the following thresholds:

(-)96V060 = 500 CFM
(-)96V070 = 500 CFM
(-)96V085 = 600 CFM
(-)96V100 = 600 CFM

Under some circumstances, such as low-speed continuous fan, the target blower CFM may be below the above threshold. In these cases the electronic air cleaner output will NOT be energized.

NOTE: Maximum current is 1.0 amps for the electronic air cleaner output.

HUMIDIFIER
Humidifier output is a set of dry contacts. The logic controlling these contacts and the necessary wire diagrams for installing a humidifier are detailed in the section of this manual titled Humidification/Dehumidification.

FILTERS (See Figure 42)
Keep filters clean at all times. A filter is not provided with the furnace, but one must be field-supplied and installed.

It is recommended to replace the furnace filter periodically to maintain optimum furnace performance.

TWINNING
Twinning of these furnaces is NOT permitted!
ACCESSORIES

FIELD INSTALLED OPTION ACCESSORIES (cont.)

FIGURE 42
FILTER LOCATIONS

UPFLOW/HORIZONTAL

SIDE RETURN

HORIZONTAL/DOWNFLOW

Accessories
HIGH ALTITUDE

NATURAL GAS AT HIGH ALTITUDES

No high altitude pressure switch changes are required; only a 4% derate at altitudes above 2,000 feet.

NATURAL GAS

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 IN CANADA, NATURAL GAS AND PROPANE INSTALLATION CODE, CSA B149.1.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>IN CANADA, AS AN ALTERNATE TO ADJUSTING THE BURNER ORIFICE SIZE, 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.</td>
</tr>
</tbody>
</table>

NOTE: Factory installed orifices are calculated and sized based on a sea level Natural Gas heating value of 1100 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 Annex E, tables E.1.1(a) and E.1.1(d). For a simplified estimation of orifice size based on heating value and elevation, use Table 13. However, calculations are the best method.

Example: 900 BTU/ft³ Regional Natural Gas Heating Value

\[
\frac{I}{H} = Q \\
\frac{14000}{900} = 15.56 \text{ ft}^3
\]

\[
I = \text{Sea Level input (per burner)}: 14000 \\
H = \text{Sea Level Heating Value}: 900 \\
Q = 15.56 \text{ ft}^3 \text{ Natural Gas per hour.}
\]

From Table E.1.1(a) of National Fuel Gas Code Handbook, current edition (3.5” w.c. column)

Orifice required at Sea Level: #49

From Table E.1.1(d) of National Fuel Gas Code Handbook, current edition

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

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 IN CANADA, NATURAL GAS AND PROPANE INSTALLATION CODE, CSA B149.1.
TABLE 14

NATURAL GAS ORIFICE SELECTION BASED ON HEATING VALUE & ELEVATION*

Notes:
1. All R92, R95 single stage and R96 two stage units are factory equipped with orifices sized for 1100 sea level heating value gas.

2. Local utilities adjust the sea level heating value of gases used at higher elevations to compensate for appliance operation at altitude. Installer must be aware of the local heating value (sea level standard) to use the chart below.

3. This chart is based on the National Fuel Gas Code (NFGC) Annex F based on natural gas with a specific gravity of 0.60

4. The recommended orifices below allow the furnace to operate within 10% of design rate. However, NFGC calculations are the best method.

5. Furnace operation is optimized when operating at design rate. Installer is responsible to verify rate.

6. This table applies to 90+ models only with 14,000BTU/Burner. DO NOT USE THIS CHART FOR ANY 80+ FURNACE MODEL.

<table>
<thead>
<tr>
<th>Sea Level to 1,999'</th>
<th>2,000' to 2,999'</th>
<th>3,000' to 3,999'</th>
<th>4,000' to 4,999'</th>
<th>5,000' to 5,999'</th>
<th>6,000' to 6,999'</th>
<th>7,000' to 7,999'</th>
<th>8,000' to 8,999'</th>
<th>9,000' to 9,999'</th>
<th>10,000'</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000-1,100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
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<tr>
<td>50</td>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>49</td>
<td>50</td>
<td>51</td>
<td>51</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>52</td>
</tr>
</tbody>
</table>

| 900-999             |                  |                  |                  |                  |                  |                  |                  |                  |         |
| 51                  | 52               | 52               | 53               | 53               | 53               | 53               | 53               | 53               | 53      |
| 50                  | 51               | 52               | 52               | 53               | 53               | 53               | 53               | 53               | 53      |
| 49                  | 50               | 50               | 50               | 51               | 51               | 52               | 52               | 52               | 52      |
| 48                  | 49               | 49               | 49               | 50               | 50               | 51               | 51               | 51               | 51      |
| 47                  | 49               | 49               | 49               | 50               | 50               | 51               | 51               | 51               | 51      |
| 46                  | 47               | 47               | 47               | 48               | 48               | 49               | 49               | 49               | 49      |

| 800-899             |                  |                  |                  |                  |                  |                  |                  |                  |         |
| 51                  | 52               | 52               | 53               | 53               | 53               | 53               | 53               | 53               | 53      |
| 50                  | 51               | 52               | 52               | 53               | 53               | 53               | 53               | 53               | 53      |
| 49                  | 50               | 50               | 50               | 51               | 51               | 52               | 52               | 52               | 52      |
| 48                  | 49               | 49               | 49               | 50               | 50               | 51               | 51               | 51               | 51      |
| 47                  | 49               | 49               | 49               | 50               | 50               | 51               | 51               | 51               | 51      |
| 46                  | 47               | 47               | 47               | 48               | 48               | 49               | 49               | 49               | 49      |

| 700-799             |                  |                  |                  |                  |                  |                  |                  |                  |         |
| 49                  | 49               | 49               | 49               | 50               | 50               | 51               | 51               | 51               | 51      |
| 48                  | 47               | 47               | 47               | 48               | 48               | 49               | 49               | 49               | 49      |
| 46                  | 47               | 47               | 47               | 48               | 48               | 49               | 49               | 49               | 49      |

*Table is derived from Appendix of the National Fuel Gas Code. To determine the correct orifice for your installation consult the National Fuel Gas Code tables F.1 and F.4

**Be sure to use sea level heating value. When requesting the heating value from a local utility, it must be converted to sea level equivalent in order to use this table.

Note: Above 5,000ft, the last 2 elbows on an alternate horizontal termination which are on the exterior of the building will be counted in the maximum vent length and maximum number of elbows permitted.
HIGH ALTITUDE

LP GAS AT HIGH ALTITUDES

ORIFICE INSTALLATION
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 this furnace product. The National Fuel Gas Code LP orifices are based on an 11" of water column pressure at the orifice, which differs from this furnace product 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 Table 15.

ORIFICE ORDERING INFORMATION
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):
Orifice Part Number 62-22175-(drill size)
Example 1:
# 60 drill size orifice required
Part # 62-22175-60

Example 2:
1.10 mm drill size orifice required
Part # 62-22175-90

ALTERNATE METHOD OF 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 16.

The information in Table 16 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 43 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 15**

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Input (per burner) 14000</th>
<th>Orifice Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 2000 ft</td>
<td>14,000</td>
<td>1.10 mm</td>
</tr>
<tr>
<td>2000'-3000'</td>
<td>12,320</td>
<td>#58</td>
</tr>
<tr>
<td>3000'-4000'</td>
<td>11,760</td>
<td>#59</td>
</tr>
<tr>
<td>4000'-5000'</td>
<td>11,200</td>
<td>#59</td>
</tr>
<tr>
<td>5000'-6000'</td>
<td>10,640</td>
<td>#60</td>
</tr>
<tr>
<td>6000'-7000'</td>
<td>10,080</td>
<td>#60</td>
</tr>
<tr>
<td>7000'-8000'</td>
<td>9,520</td>
<td>#61</td>
</tr>
<tr>
<td>8000'-9000'</td>
<td>8,960</td>
<td>#62</td>
</tr>
<tr>
<td>9000'-10000'</td>
<td>8,400</td>
<td>#63</td>
</tr>
</tbody>
</table>

**TABLE 16**

<table>
<thead>
<tr>
<th>NATURAL GAS</th>
<th>LP GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALTITUDE</td>
<td>INPUT</td>
</tr>
<tr>
<td>0' - 2000'</td>
<td>42,000</td>
</tr>
<tr>
<td>2001' - 4500'</td>
<td>37,800</td>
</tr>
</tbody>
</table>

**FIGURE 43**

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
COMMUNICATING FURNACE CONTROL

START-UP AND SEQUENCE OF OPERATIONS

This furnace is equipped with a direct ignition control. Each time the room thermostat calls for heat, the ignitor lights the main burners directly. See the lighting instructions on the furnace.

TO START THE FURNACE

1. Remove the burner compartment control access door.
2. **IMPORTANT:** 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.
3. Turn off the furnace electrical power and set the room thermostat to its lowest setting.
4. Turn the gas control to the “ON” position or move the gas control lever to the “On” position.
5. Replace the burner compartment control access door.
6. Turn on the furnace electrical power.
7. Set the room thermostat to a point above room temperature to light the main burners. The heat call should be adequate to activate the high stage gas heat – generally, the thermostat setpoint should be more than 2°F above room temperature. Consult your thermostat specs to be sure.
8. Operate high gas heat for a minimum period of 15 minutes and adjust input rate (See Section of this book titled Adjusting Input Rate) and observe condensate system for leaks. Correct leaks and set rate, shut down furnace and repeat until no leaks in condensate system can be detected.
9. Twenty seconds after flame is sensed, the gas valve is set to the thermostat demand (low or high) (note if thermostat demand is high, the gas valve is already at high stage and will not switch) and the main blower continues until timed off by the setting on the integrated furnace control board.

TO SHUT DOWN THE FURNACE

1. Set the room thermostat to its lowest setting and wait for furnace to shut down.
2. Remove the burner compartment control access door.
3. Shut off the gas to the main burners by turning the gas control to the “OFF” position.

SEQUENCE OF OPERATION

HONEYWELL CONTROLS Integrated Controls with Direct Spark Ignition.

1. Each time the thermostat “W” (Heating) contacts close (legacy) or a communicating heat call is transmitted to the furnace control from a communicating thermostat, the furnace control checks to make sure that both pressure switches are open. This is true of a low or high heat call as “W” is energized on either call. Next the induced draft blower (inducer) begins a pre-purge cycle at high stage.
2. The air proving negative pressure switches (both low and high) close.
3. After the 30-second pre-purge, the gas valve opens on high stage for an 8-second trial for ignition.
4. The spark igniter is energized to light the gas burners and stays energized for the up to 7 seconds after the gas valve opens.
5. Eight seconds after the gas valve opens the remote flame sensor must prove flame ignition for one second using the process of flame rectification. If the burners don’t light, the system goes through another ignition sequence. It does this up to four times before entering a 1-hour lockout.
6. Twenty seconds after flame is sensed, the gas valve is set to the thermostat demand (low or high) (note if thermostat demand is high, the gas valve is already at high stage and will not switch) and the main blower will be energized at either the low or high gas heat stage depending on the thermostat demand.
7. When the thermostat “W” (legacy) or communicated heat call ends, the gas valve closes, flame is extinguished, the induced draft blower stops after a 10-second post-purge, and the negative pressure switch opens.
8. The main blower continues until timed off by the setting on the integrated furnace control board.

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

1. Each time the thermostat “W” (Heating) contacts close, the furnace control checks to make sure that both pressure switches are open. This is true of a low or high heat call as “W” is energized on either call. Next the induced draft blower (inducer) begins a pre-purge cycle at high stage.
2. After the 30-second pre-purge, the gas valve opens on high stage for an 8-second trial for ignition.

**WARNING**

**SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, CLOSE THE MANUAL GAS VALVE FOR 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.**
FIGURE 44
R96V TWO-STAGE COMMUNICATING FURNACE CONTROL LAYOUT
1. **P1 (4-Pin), P2 (7-Pin) and P5 (5-Pin) - Low-Voltage Internal Wiring** Connections – Connect main twist-lock wire harness to these connections. Pre-wired from the factory.

2. **RJ-14 CONNECTOR (J1)**

   **WARNING**

   **DO NOT CONNECT A TELEPHONE OR PHONE LINE TO THE CONNECTOR (JACK) AT POSITION J-11. DOING SO COULD CAUSE IRREPARABLE DAMAGE TO EITHER THE FURNACE CONTROL (I.F.C.) OR THE TELEPHONE (OR TELEPHONE LINE) OR BOTH.**

   This connector is used to program the furnace control at the factory. It should never be connected to a telephone line or a telephone. Doing so could damage the furnace control or the telephone (or telephone lines) or both.

3. **SPARK IGNITION TRANSFORMER (T1)**
   The spark ignition transformer resides on the furnace control. The transformer provides spark energy at approximately 60 hz frequency and a minimum of 12KV.

4. **BIAS / TERMINATION (S4)**
   For current installations, all three of the dip-switches in bank SW4 must be in the “OFF” position. If not, the system may not be able to communicate.

5. **COMMUNICATIONS LED'S (U38)**
   Two LED’s are provided to indicate the status of communications. A red LED (Labeled TX) is provided for transmit and a green LED (Labeled RX) is provided for receive. These LED’s will be lit in an undefined pattern when other communicating components are attached and communicating with the furnace control.

6. **LINE VOLTAGE CONNECTIONS (120VAC, L1)**
   Four ¼” Quick-Connect style terminals are provided for internal connections and accessories.

7. **INDUCED DRAFT MOTOR (INDUCER) OUTPUT (P3)**
   This three-pin Mate-n-Lok style connector provides power to both the high and low speed inducer outputs.

8. **NEUTRAL TERMINALS (N)**
   Four ¼” Quick-Connect style terminals are provided for internal connections and accessories.

9. **ELECTRONIC AIR CLEANER (E.A.C.) OUTPUT (T3)**
   This output is used to energize an electronic air cleaner. The output will provide 1.0 amp at 115 VAC. This output is energized any time the divide motor is above the airflow CFM values specified below. Airflow below this value is not considered to be enough for a typical electronic air cleaner to perform properly.

   For ½ HP motors - Electronic air cleaner is energized any time the blower is above 500 CFM
   For ¾ HP motors - Electronic air cleaner is energized any time the blower is above 600 CFM
   For 1 HP motors - Electronic air cleaner is energized any time the blower is above 700 CFM

   Continuous fan speeds are selectable and some lower fan speeds may not deliver enough airflow to operate an electronic air cleaner. The IFC determines the minimum airflow necessary to operate an electronic air cleaner and will not turn on the electronic air cleaner unless the airflow is high enough for the EAC.

10. **HUMIDIFICATION (T3) AND DEHUMIDIFICATION HUMIDIFIER** – The humidifier contacts (labeled “HUM” (2)) are “dry” contacts on the I.F.C. This means that the terminals are connected directly to the contacts of a board-mounted relay. The coil of the relay is controlled by the microprocessor of the IFC. The coil is engaged roughly any time the heat speed blower is engaged and (1) 24VAC is present on the thermostat terminal of the IFC labeled “HUM STAT” or (2) a communicating thermostat with humidification and dehumidification capability is installed with call for humidification present. (See Figure 45 for location of humidification/dehumidification inputs on furnace control.)
INTEGRATED FURNACE CONTROL

HUMIDIFICATION/DEHUMIDIFICATION

An optional 24VAC humidistat can be installed as shown in Figures 46 thru 49. With the optional humidistat, two separate conditions must be met before humidification can begin 1). There must be a call for heat and the blower must be engaged and 2.) The humidistat must determine that there is a need for humidification. Note: Dipswitch S2-8 (labeled “ODD”) enables (“ON”) or disables (“OFF”) de-humidification operation. However, it has no affect on humidification operation. If this switch is set to the “ON” position and no humidistat is installed, the cooling airflow will be permanently reduced by approximately 15% giving less than optimal performance and possibly causing problems. It is not recommended to leave this switch in the “ON” position without a humidistat installed.

Control of dehumidification in cooling and/or humidification in heating can be done with a variety of methods depending on whether there is a communicating thermostat or a humidistat available and depending on the type of operation desired.

With systems configured with communicating thermostats and condensers, dehumidification is controlled by the thermostat and is not affected by the position of dipswitch SW2-1 or the voltage at the thermostat input T2 labeled “HUM STAT” on the furnace. To determine which wiring diagram and method to use, select from the following configurations:

A. HUMIDIFICATION CONTROL ONLY WITH NO DEHUMIDIFICATION (REQUIRES OPTIONAL HUMIDIFIER).

A1. WITH COMMUNICATING THERMOSTAT
Humidifier control is included with EcoNet communicating thermostats. To wire the furnace for humidification control using an EcoNet communicating thermostat, refer to the wiring diagram in Figure 46. Be sure not to install the jumper between “R” and “HUM STAT” on the furnace control. Installing this jumper will operate the humidifier any time there is a heat call. Without the jumper, the humidification call from the thermostat must be active and a heat call must be present with the blower running.

A2. WITH NON-COMMUNICATING THERMOSTAT
A2-1 CONTINUOUS HUMIDIFIER OPERATION DURING HEATING.
For continuous humidifier operation during heating, refer to Figure 46 and make sure to install the jumper between the thermostat terminals labeled “R” and “HUM STAT”. A separate humidistat is not required for this configuration and the humidifier will turn on whenever there is a call for heat and the blower is running.

A2-2 CONTROLLED HUMIDIFIER OPERATION USING A HUMIDISTAT (REQUIRES OPTIONAL HUMIDISTAT).
Controlled humidification can be accomplished using a humidistat as shown in Figures 47 or 48. These figures show installation of a humidifier with external and internal power supplies respectively. Dehumidification operation will be disabled if the dipswitch S2-8 is in the “OFF” position. If this switch is in the “ON” position, humidification control will be active.

B. DEHUMIDIFICATION CONTROL WITH NO HUMIDIFICATION

B1. WITH COMMUNICATING THERMOSTAT
For communicating thermostats listed with this furnace, dehumidification is controlled automatically when selected at the thermostat and additional wiring is not necessary. The actual airflow demand (reduced for dehumidification) is requested of the furnace by the thermostat.

B2. WITH NON-COMMUNICATING THERMOSTAT (REQUIRES OPTIONAL HUMIDISTAT)
Control of dehumidification only (no humidification) can be accomplished by installing an optional humidistat as shown in Figure 49. The dipswitch S2-8 must be set to the “ON” position. If this switch is not turned “ON”, dehumidification operation will not take place. Further, if this switch is “ON” and no humidistat is installed, airflow in cooling will be permanently reduced by approximately 15%.

C. HUMIDIFICATION AND DE-HUMIDIFICATION CONTROL (REQUIRES OPTIONAL HUMIDIFIER).

C1. WITH COMMUNICATING THERMOSTAT
Humidifier control is included with EcoNet communicating thermostats. To wire the furnace for humidification and dehumidification control using an EcoNet communicating thermostat, refer to the wiring diagram in Figure 46. Be sure not to install the jumper between “R” and “HUM STAT” on the furnace control. Installing this jumper will operate the humidifier any time there is a heat call and dehumidification will never take place when in cooling. Without the jumper, a humidification call from the thermostat must be active and a heat call must be present with the blower running for the “HUM” relay contacts to close.
HUMIDIFICATION/DEHUMIDIFICATION

C2. WITH NON-COMMUNICATING THERMOSTAT (REQUIRES OPTIONAL HUMIDISTAT)
For non-communicating thermostats, an optional humidistat must be installed. Controlled humidification and dehumidification can be accomplished using a humidistat as shown in Figures 47 or 48. These figures show installation of a humidifier with external and internal power supplies respectively. Dehumidification operation will be disabled if the dipswitch S2-8 is in the “OFF” position. If this switch is in the “ON” position, dehumidification control will be active.

FIGURE 46
WIRING FOR OPTIONAL HUMIDIFICATION (AND DE-HUMIDIFICATION WITH COMMUNICATING THERMOSTAT) WITH OPTIONAL HUMIDIFIER AND NO HUMIDISTAT (HUMIDIFICATION ACTIVE DURING ANY HEAT CALL) (FOR USE WITH COMMUNICATING OR NON-COMMUNICATING THERMOSTATS)

FIGURE 47
WIRING FOR OPTIONAL DE-HUMIDIFICATION AND HUMIDIFICATION (WITH OPTIONAL HUMIDISTAT AND HUMIDIFIER).
NOTE: CAN BE USED WITH COMMUNICATING OR NON-COMMUNICATING SYSTEMS.
11. COMMUNICATING ECM MOTOR COMMUNICATIONS (CONTROL) CONNECTION (P4)

This connector sends and receives messages to and from the blower motor through a single peer-to-peer network. The blower motor does not communicate on the same communications buss as the furnace, condenser (or heat-pump) and thermostat. Further, a different communications protocol is used.

12. DIPSWITCHES; S1, S2 AND S3

NOTES:
1. There is a protective cover over the dipswitches that must be penetrated to change the dipswitch position. Use a pen or similar tool to penetrate the cover and change the position. This is normal and penetration of the protective cover will not damage the dipswitch.
Low airflow is 75% of full airflow with Switch 9 in the OFF position. If Switch 9 is in the ON position, low airflow is 50% of full airflow.
INTEGRATED FURNACE CONTROL

DIPSWITCHES

2. For communicating systems, dipswitches are not used. Configuration changes are made with the thermostat.

A. Seven-Segment Display Orientation; S1-1

As the control will be applied in a multi-position furnace a means of changing the orientation of the seven segment display is provided. This dipswitch is to be labeled S1-1. Factory setting of the S1-1 dipswitch is OFF.

S1-1 = OFF = Upflow (as-shipped) position
S1-1 = ON = Downflow position

B. Cool Blower-Off Delay; S1-2 & S1-3

A means of selecting the cooling speed blower "off" delay time is provided. In legacy mode, dipswitches are required to select the delay time. These dipswitches are to be labeled S1-2 and S1-3. The following table defines the settings:

<table>
<thead>
<tr>
<th>S1-2</th>
<th>SW3</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>30 seconds</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>45 seconds</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>60 seconds</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>0 seconds</td>
</tr>
</tbody>
</table>

Note: Factory setting = 30 seconds

C. Cooling Airflow Selection; S1-4 & S1-5

S1-4 and S1-5 are to be used to select cooling airflow in legacy mode. The value used for each selection is specified below.

HIGH COOL SELECTIONS:

<table>
<thead>
<tr>
<th>S1-4</th>
<th>S1-5</th>
<th>½ HP Blower (56 &amp; 70KBTU)</th>
<th>¾ HP Blower (84 &amp; 98KBTU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>1050 CFM</td>
<td>1750 CFM</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>875 CFM</td>
<td>1400 CFM</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>700 CFM</td>
<td>1225 CFM</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>525 CFM</td>
<td>1050 CFM</td>
</tr>
</tbody>
</table>

LOW COOL SELECTIONS:

The following model data fields are multipliers to be used for low stage legacy cooling unless dipswitch S2-9 is in the ON position - in which case the low cooling airflow becomes 50% of the high cooling airflow.

D. Cooling/Heat Pump Airflow Trim; S1-6 & S2-7

Two dipswitches (S1-6, S2-7) are to be provided for legacy cool airflow trim. The value used for each selection is specified below. Two of these values are taken from the furnace Model Data file.

<table>
<thead>
<tr>
<th>S1-6</th>
<th>S2-7</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>No Adjust. (Factory Setting)</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>+10%</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>-10%</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>No Adjust.</td>
</tr>
</tbody>
</table>

E. ODD (On Demand Dehumidification); S2-8

One dipswitch (S2-8) is to be provided to enable the dehumidification feature in legacy mode. Selections are as follows:

S2-8=OFF ODD not enabled. (Factory Setting)
S2-8=ON ODD enabled. 0VAC on “HUM STAT” will decrease airflow in cooling.

F. Tandem Airflow Select; S2-9

One dipswitch (S2-9) shall be used to select the percentage of airflow for the base first stage cooling airflow in legacy mode. Note that further adjustments may also be applied (e.g. for active dehumidification or cooling airflow trim).
INTEGRATED FURNACE CONTROL

DIPSWITCHES

<table>
<thead>
<tr>
<th>S2-9</th>
<th>Low Cool % of 2nd Stage Cooling Airflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>50%</td>
</tr>
<tr>
<td>OFF</td>
<td>75%</td>
</tr>
<tr>
<td>OFF</td>
<td>is Factory Setting</td>
</tr>
</tbody>
</table>

G. Auto Stage; S2-10 & S2-11

There are applications where a single stage thermostat is used with the two stage furnace. With these applications the furnace will initially operate in the low heat stage. Based upon a user selected time, the furnace will automatically stage to high heat stage mode. Auto staging will take place with a 24VAC signal on “W1” when autostaging is turned on. “W2” will be recognized as a call for stage 2 heat even when autostaging is active. The following dipswitches are available to accommodate this requirement:

<table>
<thead>
<tr>
<th>S2-10</th>
<th>S2-11</th>
<th>AutoStage</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>Normal 2 stage operation (Autostaging is off)(factory setting)</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>AutoStage, 10 minutes on low, then to high with call on “W1”</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>AutoStage, 15 minutes on low, then to high with call on “W1”</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>AutoStage, 20 minutes on low, then to high with call on “W1”</td>
</tr>
</tbody>
</table>

H. Continuous Fan Speed; S2-12

One dipswitch (S2-12) is to be provided for legacy continuous fan adjustment.

Selections are as follows:

S2-12 =OFF = 500 CFM for ½ HP, 700 for 3/4HP, 800 CFM for 1 HP motors. (factory setting)

S2-12 =ON = 800 CFM for ½ HP, 1200 for 3/4HP, 1600 CFM for 1 HP motors.

I. Low Gas Heat Rise (Airflow) Adjustment; S3-13, S3-14

Two dipswitches (S3-13, S3-14) shall be used to select low (1st stage) gas heat rise airflow adjustment in legacy mode. Each selection will use a different airflow demand for first stage gas heat. The selections are set to approximate a specified temperature rise as follows. Note: Temperature rise will vary based on conditions and technician should always check temperature rise.

<table>
<thead>
<tr>
<th>S3-13</th>
<th>S3-14</th>
<th>Target Temperature Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>Nominal Value Specified on Rating Label (Factory Setting) (Approx.)</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>Approx. +7°F</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>Approx. -7°F</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>Approx. +12°F</td>
</tr>
</tbody>
</table>

J. High Gas Heat Rise (Airflow) Adjustment; S3-15, S3-16

Two dipswitches (S3-15, S3-16) shall be used to select high (2nd stage) gas heat rise airflow adjustment in legacy mode. Each selection will use a different airflow demand for second stage gas heat. The selections are set to approximate a specified temperature rise as follows. Note: Temperature rise will vary based on conditions and technician should always check temperature rise.

<table>
<thead>
<tr>
<th>S3-15</th>
<th>S3-16</th>
<th>Target Temperature Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>Nominal Value Specified on Rating Label (Factory Setting) (Approx.)</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>Approx. +7°F</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>Approx. -7°F</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>Approx. +12°F</td>
</tr>
</tbody>
</table>

K. Heat Blower Off Delay; S3-17, S3-18

Two dipswitches (S3-17, S3-18) can be used to select heat blower off delays (in seconds) in legacy mode.

<table>
<thead>
<tr>
<th>S3-17</th>
<th>S3-18</th>
<th>Heat OFF Delay (high &amp; low)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>90 (Factory Setting)</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>120</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>160</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>180</td>
</tr>
</tbody>
</table>

L. Manual Fault Clear

Dipswitch S3-18 also doubles as a means to clear the fault history buffer. The switch can be turned off/on/off/on/off/on (three times) or on/off/on/off/on/off (three times) within less than 30 seconds and the fault buffer will be cleared.
INTEGRATED FURNACE CONTROL

MODEL DATA CARD & DUAL SEVEN-SEGMENT DISPLAY

13. MODEL DATA CARD CONNECTOR (P6)

There is a factory-installed model data card which is wire-tied to the furnace. At no time should this card be removed from the furnace except during replacement of the control.

MODEL DATA CARD

A model data card is defined as an electronic card that carries a copy of the furnace model data.

WARNING

DO NOT REPLACE THE FURNACE CONTROL OR MEMORY CARD OF THE FURNACE WITH A FURNACE CONTROL OR MEMORY CARD OF ANOTHER FURNACE OR ANOTHER COMPONENT (E.G.: A MEMORY CARD FROM A CONDENSER OR AIR HANDLER). THE WRONG FURNACE CONTROL OR MEMORY CARD MAY SPECIFY PARAMETERS WHICH WILL MAKE THE FURNACE RUN AT UNDESIRED CONDITIONS INCLUDING (BUT NOT NECESSARILY LIMITED TO) REDUCED AIRFLOW DURING HEATING CAUSING EXCESSIVE UNDESIRED OPERATION OF THE MAIN LIMIT CONTROL. FURTHER, THE MEMORY CARD IS SPECIFIC TO THE MODEL NUMBER AND BTU INPUT RATING FOR A SPECIFIC FURNACE AND THIS INFORMATION SHOULD NOT BE TRANSPORTED FROM ONE FURNACE (OR COMPONENT) TO ANOTHER.

The furnace control receives model-specific data from the model data card.

Replacement memory cards with the appropriate furnace model data for any given model can be ordered from the Replacement Parts Division. In the event that the original memory card is lost, the original furnace control has been replaced and there is no furnace model data, the replacement memory card must be ordered and installed into the connector at P6 to give the furnace valid furnace model data. The furnace will not operate properly without the correct furnace model data. When no furnace model data is present either at the memory or on the furnace microprocessor a “d1” (NO MODEL DATA) fault code will be displayed at both the thermostat active fault screen and at the furnace control (I.F.C.) seven-segment displays.

If the original memory card is lost, it should be replaced even if there is valid furnace model data on the IFC microprocessor. The valid furnace model data on the IFC microprocessor should only be considered as a backup to the memory card.

14. DUAL SEVEN-SEGMENT DISPLAY AND FAULT CODES (U38)

NOTE: Verify display orientation is correct before interpreting fault codes. Otherwise the fault codes may be upside down.

A dual seven segment display shall be provided to display status and diagnostic code information. A fault level 1 is a low-level fault. In general, a level 2 fault is a fault that is severe enough that it prevents furnace or other critical (e.g. cooling) operation. Level 1 faults generally permit operation to continue but operation may not be at optimum performance (e.g. blower operating at power maximum). Standard operating codes (e.g. C for high-stage cooling) are considered fault level “0” as they are not faults at all but only indications of current modes of operation which are considered normal (some operational codes are displayed simultaneously with low level faults which do not interrupt operation - see paragraphs below for details).

Since usually only one fault can be displayed at the seven-segment display at any given time (see exceptions below), the fault displayed when two or more faults are present at the same time shall be resolved by the fault code list below which calls out the fault code priority. Lower numbers are considered higher priority than larger numbers. Therefore, fault code priority 0 has the highest priority and shall be displayed when present regardless of any other fault that might also be present at the same time. This mechanism does not prevent simultaneous faults from being logged into the fault code buffer.

The mode displays for heat mode (“h” “H”) shall reflect the demand from the thermostat. This includes when only a first stage heat call; “W1” is present (“W2” not present), the mode displayed should reflect the first stage demand by displaying the lower-case “h” and not the actual output of the furnace during ignition (since this configuration ignites at high stage).

Three exceptions to this rule exist as follows:

1. When the thermostat demand is for high stage and only low heat can be provided because the high pressure switch will not close or has opened and will not re-close. In this case, the mode “h” (low heat) shall be displayed alternately along with the fault “57” (open high pressure switch) (See item 5 below in this section).

2. When autostaging has been activated and a response to “W1” heat has been increased to high heat by the furnace control after the user-specified time even though a call for high heat (“W2”) is not present. In this case a capital “H” shall be displayed and not a lower-case “h”.

WARNING

DO NOT REPLACE THE FURNACE CONTROL OR MEMORY CARD OF THE FURNACE WITH A FURNACE CONTROL OR MEMORY CARD OF ANOTHER FURNACE OR ANOTHER COMPONENT (E.G.: A MEMORY CARD FROM A CONDENSER OR AIR HANDLER). THE WRONG FURNACE CONTROL OR MEMORY CARD MAY SPECIFY PARAMETERS WHICH WILL MAKE THE FURNACE RUN AT UNDESIRED CONDITIONS INCLUDING (BUT NOT NECESSARILY LIMITED TO) REDUCED AIRFLOW DURING HEATING CAUSING EXCESSIVE UNDESIRED OPERATION OF THE MAIN LIMIT CONTROL. FURTHER, THE MEMORY CARD IS SPECIFIC TO THE MODEL NUMBER AND BTU INPUT RATING FOR A SPECIFIC FURNACE AND THIS INFORMATION SHOULD NOT BE TRANSPORTED FROM ONE FURNACE (OR COMPONENT) TO ANOTHER.
DUAL SEVEN-SEGMENT DISPLAY

3. For 90+ furnaces only: Low pressure switch fails 5 times in one heat call. Then device is forced to the high rate to reveal possible Water Sensed condition. An upper-case “H” is displayed in this circumstance regardless of the thermostat demand.

When the furnace is in a heat or cool blower off delay, the display should be “0”.

A standard operating code (with fault level “0”) shall be displayed steady-on.

When displaying a fault code, it shall be flashed and not be displayed steady-on. It shall be flashed on for one second, then off for ½ second then on again. Cycle repeats until the fault is cleared. Each fault is flashed (displayed) a minimum of two times even if the fault condition has cleared before the fault can be displayed twice.

Dual Faults Displayed

Normally only one fault or status character is displayed at the Seven-segment display at any given time. Exceptions for some dual faults are noted below.

Sequence of display:

A. The first fault will be displayed for one second
B. The upper-most horizontal segment of the right seven-segment display is energized for ½ second
C. The second fault is displayed for one second
D. The upper-most horizontal segment of the right seven-segment display is energized for ½ again.

This cycle repeats until one or both faults are gone or otherwise as noted below:

1. When both high pressure switch and low pressure switch are open and both should be closed fault codes “45” and “57” will be displayed alternately as described above (A-D).
2. When a failed ignition has occurred four times in a row, the control enters one-hour lockout and fault codes “10” and “11” will be displayed alternately as described above (A-D).
3. When flame is lost five times in a row, the control enters one-hour lockout and fault codes “10” and “13” will be displayed alternately as described above (A-D).
4. When both the high pressure switch and low pressure switch are closed and both should be open (as in during the pressure switch proving period). In this case fault codes “44” and “55” will be displayed alternately as described above (A-D).
5. When the high pressure switch is open and the demand from the thermostat is set to 100% heat . . . In this case the operation code “h” (for low heat) and the fault code “57” (open high pressure switch) will be displayed alternately.
6. While the control is in one-hour lockout due to an unexpected flame, the fault codes “14” (unexpected flame) and “10” (soft lockout) will be displayed alternately as described above (A-D).
7. While the control has entered a one-hour lockout after declaring a dead blower after the main limit control has been open for more than 150 seconds, the fault codes “61” (Non-operational blower) and “10” (soft lockout) will be displayed alternately as described above (A-D). Note: the dead blower fault and associated one-hour lockout will occur up to four times in one heat call. Upon declaring this fault for the fourth time in one heat call, the control will enter hard lockout.
8. When the main limit has been open during a gas heat call for more than 150 seconds and has not yet re-closed, the fault codes “61” (Non-operational blower) and “22” (open limit) will be displayed alternately as described above (A-D) until the limit re-closes.
9. When the water level sensor has declared a 1-hr lockout after declaring a Water Sensed condition (heating operation is shut down due to this fault) several times consecutively. When the control enters lockout the fault codes “59” (Water Sensed) and “10” (soft lockout) will be displayed alternately as described above (A-D).
10. When IFC is in soft lockout and fault “93” is active, the fault code “93” is to be displayed alternately with the fault code “10”.
11. When gas valve is open, flame is sensed and IFC detects a fault condition which will not prevent gas heating operation from continuing (like fault “57”, “12”, “66”, . . .), IFC will display the operation code “h” or “H” alternately with the active fault code.
INTEGRATED FURNACE CONTROL

DUAL SEVEN-SEGMENT DISPLAY

The fault and mode codes and fault priorities are listed below. Priority is to be used to determine which fault to display when two or more faults are present simultaneously.

<table>
<thead>
<tr>
<th>Priority</th>
<th>Code</th>
<th>Description</th>
<th>Fault Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>30</td>
<td>Open Fuse</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>93</td>
<td>Internal Control Fault Detected</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>d1</td>
<td>No Model Data</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>68</td>
<td>No Blower Communications</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>61</td>
<td>Blower Fault - Motor Can NOT Run</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>26</td>
<td>Line and Neutral Reversed or Poor Ground</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>58</td>
<td>Water Circuit Open</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>Flame Present with Gas Valve Off</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>33</td>
<td>Over Temperature Switch (RollOut) Open</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>23</td>
<td>Auxiliary Limit Switch Open</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>22</td>
<td>Main Limit Switch Open</td>
<td>1,2</td>
</tr>
<tr>
<td>11</td>
<td>59</td>
<td>Water Sensed</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>One-hour Lockout</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>44</td>
<td>Low Pressure Switch Closed, Inducer Off</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>45</td>
<td>Low Pressure Switch Open, Inducer on High Speed</td>
<td>1,2</td>
</tr>
<tr>
<td>15</td>
<td>46</td>
<td>Low Pressure Switch Open, Inducer on Low Speed</td>
<td>1,2</td>
</tr>
<tr>
<td>16</td>
<td>55</td>
<td>High Pressure Switch Closed, Inducer Off</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>57</td>
<td>High Pressure Switch Open, Inducer on High Speed</td>
<td>1,2</td>
</tr>
<tr>
<td>18</td>
<td>11</td>
<td>Failed Ignition</td>
<td>1,2</td>
</tr>
<tr>
<td>19</td>
<td>13</td>
<td>Flame Lost after Established</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>66</td>
<td>Blower Cutback</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>60</td>
<td>Blower Fault - Blower Can Still Run</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>12</td>
<td>Low Flame Sense Current</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>H</td>
<td>Call for High Heat</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>h</td>
<td>Call for Low Heat</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>C</td>
<td>Call for High Cooling Present</td>
<td>0</td>
</tr>
<tr>
<td>26</td>
<td>c</td>
<td>Call for Low Cooling Present</td>
<td>0</td>
</tr>
<tr>
<td>27</td>
<td>cd</td>
<td>Low Cooling with Dehumidification Active</td>
<td>0</td>
</tr>
<tr>
<td>28</td>
<td>Cd</td>
<td>High Cooling with Dehumidification Active</td>
<td>0</td>
</tr>
<tr>
<td>29</td>
<td>hP</td>
<td>Low Heat Pump Operation</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>HP</td>
<td>High Heat Pump Heating Operation</td>
<td>0</td>
</tr>
<tr>
<td>31</td>
<td>dF</td>
<td>DeFrost Operation</td>
<td>0</td>
</tr>
<tr>
<td>32</td>
<td>F</td>
<td>Call for Fan Present</td>
<td>0</td>
</tr>
<tr>
<td>33</td>
<td>82</td>
<td>Supply Air Sensor Fault</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>84</td>
<td>Outdoor Air Sensor Fault</td>
<td>1</td>
</tr>
<tr>
<td>35</td>
<td>81</td>
<td>Return Air Sensor Fault</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td>d4</td>
<td>No Valid Model Data on Memory Card</td>
<td>1</td>
</tr>
<tr>
<td>37</td>
<td>d6</td>
<td>Horsepower Conflict on Memory Card</td>
<td>1</td>
</tr>
<tr>
<td>38</td>
<td>0</td>
<td>System Off, Standby Mode no Thermostat Calls or Errors.</td>
<td>0</td>
</tr>
<tr>
<td>39</td>
<td>99</td>
<td>Remote Faults Reset Performed</td>
<td>1</td>
</tr>
</tbody>
</table>
PUSHBUTTON

15. PUSHBUTTON (S8)

The status mode is entered when the pushbutton is pressed for less than 2 seconds. While in the Status menu at the seven segment displays, the category field is displayed first for one second immediately followed by the appropriate value for one second. This cycle repeats until 60 seconds has expired or the pushbutton has been pushed again for less than two seconds. If the button is pressed again for less than 2 seconds within the 60 second period, the next field will be displayed and the 60 second timer will be reset. After displaying all of the categories listed, the control will loop back to the first category when the button is pressed again for less than 2 seconds.

If within the status menu, if the button is pressed for more than 2 seconds but less than 5 seconds, the display will exit the status menu upon release of the pushbutton. Otherwise, the status menu will automatically exit if no activity is sensed on the pushbutton for 60 seconds.

The categories will be displayed in the following sequence:

<table>
<thead>
<tr>
<th>Category</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL</td>
<td>Up to six faults (Example: —21-14-29—)</td>
</tr>
<tr>
<td>AF</td>
<td>IBM CFM</td>
</tr>
<tr>
<td></td>
<td>(Example: 1251 = 12-51, 745 = 7-45)</td>
</tr>
<tr>
<td>Fr</td>
<td>Fire rate % (Example: 70)</td>
</tr>
<tr>
<td>UI</td>
<td>Furnace size</td>
</tr>
<tr>
<td>tr</td>
<td>Temperature Rise in Degrees F (example 75)*</td>
</tr>
</tbody>
</table>

*If the Supply air temp sensor is not available the category will not be displayed.

Fault history display (FL)

Up to 6 faults are stored in the buffer with the most recent replacing the oldest fault.

Unless otherwise specified, when a fault becomes active it is to be stored in non-volatile memory provided no more than three occurrences of any given fault code are already stored in the fault buffer. If a fault occurs and there are already 3 occurrences of the same fault in the buffer, the current fault will replace the oldest of the same fault in the buffer but will become the most recent fault displayed.

Before updating the fault history the history will be examined for the previous most recent record. If the most recent record in the history is the same fault number but has a lower fault level than the new fault, then instead of adding the new fault to the buffer, the previous fault and level are replaced with the new fault and level. The time stamp will also be updated. This way, the existing fault will be updated but a new fault will not be added.

Faults older than 168 powered hours will be automatically deleted from the fault buffer.

When fault recall is activated, the six most recent faults which have occurred within 1 week (168 powered hours) will be displayed on the seven segment display in succession from the most recent to the oldest.

When displaying fault codes stored in the buffer, the control will flash the A and D segments of the least most significant SSD for ½ second to indicate the beginning of the fault recall. Each fault shall be displayed steady for one second followed by energizing the top segment (A or D depending on the position of the Display Orientation Dip-switch) of the least significant (right most) Seven-segment display for ½ second followed by the next fault displayed for one second. This cycle repeats until all faults in the buffer are displayed. After all of the faults are displayed, the control will again energize the A and D segment of the least significant S.S.D. for ½ second.

Airflow Display (AF)

Displayed CFM range is between 100 and 9999 per following sequence:

<table>
<thead>
<tr>
<th>Step</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (sec)</td>
<td>1</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Example (1246)</td>
<td>“12”</td>
<td>Off</td>
<td>“46”</td>
<td>Off</td>
</tr>
<tr>
<td>Example (721)</td>
<td>“7” (right segment)</td>
<td>Off</td>
<td>“21”</td>
<td>Off</td>
</tr>
</tbody>
</table>

The sequence repeats until the status menu is exited or the pushbutton is pressed again.

Fire Rate Display (Fr)

Gas heat fire rate is displayed for 1 second as follows:

“0” is displayed when flame is not lit.

“HI” is displayed when flame is lit and the fire rate is high.

“Lo” is displayed when flame is lit and the fire rate is low.

Model BTU Capacity/1000 (Unit Input) (UI)

The furnace input BTU will be taken from the model data field Furnace BTU’s/1000. Values less than 100 will be displayed as two digits (example 70 displayed as 70). Values of 100 or greater will be displayed as three digits. The most significant digit will be displayed for one second on the left SSD followed by the remaining two digits which are also displayed for one second. Example: 117 would be displayed as 1 followed by 17.

Temperature Rise (tr)

Temperature rise is to be displayed (Supply Temp – Return Temp). If the Supply air temp sensor is not available the category will not be displayed.
INTEGRATED FURNACE CONTROL

PUSHBUTTON

Clearing Fault History
The fault buffer can be cleared with the pushbutton while the Fault History Display (FL) menu is active by holding down the pushbutton for 5 seconds or more. For indication that the fault buffer is clear the IFC will flash segments A and D of the right-most seven segment displays one second on and one second off three times after the fault clear command has been recognized.

The fault history can also be cleared through the HW1SHOTS write command message when Clear Alarm History Command field is set. Display will flash segments A and D as described in the paragraph above.

Extended Display Mode
If the pushbutton is pressed during the power-up sequence, IFC will turn on the extended display mode. The extended display mode modifies the display operation per the following table:

EXTENDED DISPLAY MODE – DISPLAY PROPERTIES

<table>
<thead>
<tr>
<th>Mode:</th>
<th>Step:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault</td>
<td>Info:</td>
<td>Err.Num.</td>
<td>pause</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration:</td>
<td>1sec</td>
<td>0.5sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>&quot;68&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration:</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td>0.5sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>&quot;45&quot;</td>
<td>&quot;57&quot;</td>
<td>&quot;57&quot;</td>
<td>&quot;57&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating - ign. Defrost - ign.</td>
<td>Info:</td>
<td>Mode</td>
<td>Fire rate</td>
<td>FR value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration:</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>&quot;FR&quot;</td>
<td>&quot;FR&quot;</td>
<td>&quot;FR&quot;</td>
<td>&quot;40&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating - run Defrost - ign.</td>
<td>Info:</td>
<td>Mode</td>
<td>Fire rate</td>
<td>FR value</td>
<td>CFM</td>
<td>CFM value</td>
<td>CFM value2</td>
<td>pause</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration:</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td>1sec</td>
<td>2sec</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>&quot;57&quot;</td>
<td>&quot;FR&quot;</td>
<td>&quot;40&quot;</td>
<td>&quot;13&quot;</td>
<td>&quot;00&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating - run with an error</td>
<td>Info:</td>
<td>Err.Num.</td>
<td>SEG A</td>
<td>Mode</td>
<td>SEG A</td>
<td>Fire rate</td>
<td>FR value</td>
<td>CFM</td>
<td>CFM value</td>
<td>CFM value2</td>
<td>pause</td>
</tr>
<tr>
<td></td>
<td>Duration:</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td>1sec</td>
<td>1sec</td>
<td>2sec</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>&quot;57&quot;</td>
<td>&quot;FR&quot;</td>
<td>&quot;40&quot;</td>
<td>&quot;13&quot;</td>
<td>&quot;00&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idle (blower active)</td>
<td>Info:</td>
<td>Mode</td>
<td>CFM</td>
<td>CFM value</td>
<td>CFM value2</td>
<td>pause</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration:</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td>1sec</td>
<td>2sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>&quot;AF&quot;</td>
<td>&quot;5&quot;</td>
<td>&quot;00&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HP/Cool/FAN (blower active)</td>
<td>Info:</td>
<td>Mode</td>
<td>CFM</td>
<td>CFM value</td>
<td>CFM value2</td>
<td>pause</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration:</td>
<td>1sec</td>
<td>0.5sec</td>
<td>1sec</td>
<td>1sec</td>
<td>2sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>&quot;e&quot;</td>
<td>&quot;AF&quot;</td>
<td>&quot;11&quot;</td>
<td>&quot;00&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The extended display mode remains active until power re-cycle or microprocessor reset.
16. SUPPLY AND OUTDOOR AIR TEMPERATURE SENSOR INPUTS (T4)

Optional field installed supply air and outdoor air sensors (10K NTC thermistor) shall be read from the T4 screw terminal block.

Control to resolve temperature within +/-2°F at 70°F.

There is to be an automatic detection of the supply and outdoor air sensors. If the resistance between the terminals is within a valid 10K thermistor range (supply air temp range = -40°F to 200°F, outdoor air temp range = -40 to 200°F), both sensors temperatures will be accessible.

If the resistance between the supply air terminals is determined to be out of range to a high resistance, it shall be interpreted as an uninstalled supplied air sensor and shall not cause an error condition unless a valid thermistor value was previously sensed on the same power cycle. If the sensor was determined to be present and then is opened the control should display a fault “82”. The fault is a level 1 fault and will not inhibit furnace operation. Also, if the resistance between the terminals on the OAT is determined to be out of range to a low resistance, a fault “84” is to be displayed on the seven segment displays only if a valid thermistor value was previously sensed on the same power cycle.

Fault codes “82” and “84” shall only be present for three minutes after the fault is detected. After three minutes has expired, the fault will no longer be set even if the condition creating the fault is still present. These faults are also only logged into the fault buffer one time. Should the sensor error later clear and then appear again the same sequence as noted previously will be repeated.

![Wiring Diagram](ST-A1194-63 (BOTTOM))

**FIGURE 51**
WIRING OF SUPPLY AIR (SA) AND OUTDOOR AIR (OAT) TEMPERATURE SENSORS.
AUXILIARY INPUTS

17. AUXILIARY INPUTS (COMMUNICATING SYSTEMS ONLY) (T5) (SEE FIGURE 52)

Terminal T5 is provided for field installation of up to two auxiliary switches. The auxiliary inputs shall be used to provide a means of using traditional drain pan switches, smoke detectors, freeze switches, etc. The inputs are to be labeled Aux 1 and Aux 2. The switch inputs are for communicating systems only. One or both inputs can be configured at the communicating thermostat as either normally-opened or normally closed contacts. System operation when the contacts either open or close can be configured at the communicating thermostat.

A resistance of greater than 1k ohms to common shall be detected as an open switch and a resistance of less than 100 ohms shall be recognized as a closed switch.

**FIGURE 52**
WIRING OF AUXILIARY INPUTS (USE WITH COMMUNICATING SYSTEMS ONLY).
THERMOSTAT WIRING DIAGRAMS

18. THERMOSTAT INPUTS (T2) – THERMOSTAT WIRING DIAGRAMS

Both communicating and legacy thermostats are to be connected at terminal block T2.

A. COMMUNICATING SYSTEMS

The furnace is capable of communicating with a thermostat and condenser to improve cooling and heat-pump airflow, displaying active faults and active furnace information at the thermostat and improved diagnostics and troubleshooting.

WIRING A FURNACE FOR COMMUNICATIONS.

Maximum wire lengths and notes about wiring communicating systems are noted below.

MAXIMUM COMMUNICATING WIRE LENGTHS (E1, E2, R & C)

Max Wire Length – Thermostat to Furnace = 125 FT @ 18 AWG*
Max Wire Length – Furnace to Condenser = 125 FT @ 18 AWG*
Max Wire Length – Between any 2 devices = 125 FT @ 18 AWG*
Sum Max Total Wire Length for All Components = 500 ft (see Figure 53)

Notes:
1. Wires may be solid or stranded.
2. *Wire gage smaller than 18 AWG is not approved or recommended for this application.
3. If the thermostat wiring will be located near or in parallel with high voltage wiring, cable TV, Ethernet wiring, or radio frequency equipment, then shielded thermostat wire can be used to reduce or eliminate potential interference. The shielding must be contiguous across all devices and all wire segments. This should be done by twisting the shielding wires from adjacent segments together. Further, the shielding for the entire system must be grounded in a single location. Multiple grounds on the shielding system are NOT permitted. The shield wire should be connected to the C terminal, or ground, at the indoor unit. The shield wire should NOT be connected to any terminal at the Control Center (aka; Thermostat). Connecting the shield to ground at both ends can cause current loops in the shield, reducing shield effectiveness.
4. When using existing wire from a previous installation, be sure to trim the tip of the wire back past the insulation and strip a small amount of insulation from the wire to expose clean new copper for the communicating connections. Fresh copper must be exposed when making the communicating connections or communications may not be properly established.

A1. WIRING OF COMMUNICATING THERMOSTATS.
INTEGRATED FURNACE CONTROL

THERMOSTAT WIRING DIAGRAMS

Figure 53 is the wiring diagram for connecting the furnace to an approved EcoNet communicating thermostat and approved EcoNet communicating condenser. The only approved configuration is to install dedicated wires directly from the furnace to the thermostat and a separate set of dedicated wires directly from the furnace to the condenser. Additional EcoNet devices can be added to the system as shown in Figure 53. The approved wiring configuration is the daisy-chain configuration shown in Figure 53. A star wiring configuration is not approved and should not be used.

Note: The only approved configuration requires that four dedicated wires (E1, E2, R and C) be installed from the furnace to the condenser.

A2. SPECIAL CONFIGURATION – WIRING OF NON COMMUNICATING CONDENSORS AND HEAT-PUMPS WITH COMMUNICATING FURNACE AND THERMOSTAT (SEE FIGURE 54).
B. SYSTEMS WITH LEGACY THERMOSTATS


B2. WIRING OF A 2-STAGE LEGACY THERMOSTAT (SEE FIGURE 56)

FIGURE 55
WIRING DIAGRAM FOR A LEGACY 1-STAGE THERMOSTAT WITH AUTOSTAGING.

NOTE: For 1 stage cooling a jumper between Y1 and Y2 is required!
19. **24VAC AND COMMON CONNECTIONS (E10/E11)**
For connection to the low voltage side of the control transformer. Terminals are ¼” quick-connect style.

20. **FUSE (P100/P101)**
A fuse is provided to protect low-voltage (24VAC) circuits from shorts between 24VAC and Ground or Common. A fault code 30 is displayed at the furnace control when the fuse has been opened.

On the next page is a timing diagram for normal heat sequence. This diagram assumes no faults are present during the heat call.
The maximum gas supply pressure to the furnace should be 10.5" w.c. for natural gas and 13.0" w.c. for L.P. The minimum gas supply pressure for purposes of input adjustment to the furnace should be 5" w.c. for natural gas and 11" w.c. for L.P.

A calibrated manometer is required for accurate gas pressure readings.

The manifold pressure should be set at 3.5" w.c. high fire, 1.8" low fire, for natural gas and 10" w.c. high fire and 4.9" w.c. low fire for L.P. Only small variations in the gas flow should be made by means of the pressure regulator adjustment. In no case should the final manifold pressure vary more than plus or minus 0.3" w.c. from the above-specified pressures. To adjust the pressure regulator, remove the regulator cap and turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. Then replace the regulator cap securely. Any necessary major changes in the gas flow rate should be made by changing the size of the burner orifices.

To change orifice spuds, shut off the manual gas valve and remove the gas manifold. On LP gas furnaces, the LP gas supply pressure must be set between 11" and 13" w.c. by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10" w.c. at the gas control valve. For elevations up to 2,000 feet, rating plate input ratings apply. For high altitudes (elevations over 2,000 ft.), see conversion kit index for derating and orifice spud sizes.

Checking furnace input is important to prevent over firing beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE. Use the following table or formula to determine input rate. Start the furnace and measure the time required to burn one cubic foot of gas. Prior to checking the furnace input, make certain that all other gas appliances are shut off, with the exception of pilot burners. Time the meter with only the furnace in operation.
FIELD ADJUSTMENTS

TABLE 18
METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL GAS OR L.P.

<table>
<thead>
<tr>
<th>INPUT (BTU/HR)</th>
<th>METER SIZE (FT/REV)</th>
<th>900</th>
<th>1000</th>
<th>1040</th>
<th>1100</th>
<th>2500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIN</td>
<td>SEC</td>
<td>MIN</td>
<td>SEC</td>
<td>MIN</td>
<td>SEC</td>
</tr>
<tr>
<td>56,000</td>
<td>ONE</td>
<td>0</td>
<td>58</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>TEN</td>
<td>9</td>
<td>39</td>
<td>10</td>
<td>43</td>
<td>11</td>
</tr>
<tr>
<td>70,000</td>
<td>ONE</td>
<td>0</td>
<td>46</td>
<td>0</td>
<td>51</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>TEN</td>
<td>7</td>
<td>43</td>
<td>8</td>
<td>34</td>
<td>8</td>
</tr>
<tr>
<td>84,000</td>
<td>ONE</td>
<td>0</td>
<td>39</td>
<td>0</td>
<td>43</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>TEN</td>
<td>6</td>
<td>26</td>
<td>7</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>98,000</td>
<td>ONE</td>
<td>0</td>
<td>33</td>
<td>0</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>TEN</td>
<td>5</td>
<td>31</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>112,000</td>
<td>ONE</td>
<td>0</td>
<td>29</td>
<td>0</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>TEN</td>
<td>4</td>
<td>49</td>
<td>5</td>
<td>21</td>
<td>5</td>
</tr>
</tbody>
</table>

Formula: Input BTU/HR = Heating Value of Gas (BTU/FT³) x 3600 x correction factor
Time (in seconds) for 1 cubic FT of Gas

SETTING INPUT RATE

The furnace is shipped from the factory with #51 orifices. They are sized for natural gas having a heating value of 1100 BTU/cu. ft. and a specific gravity of .60.

Since heating values vary geo-graphically, the manifold pressure and/or gas orifice size may need to be changed to adjust the furnace to its nameplate input. Consult the local gas utility to obtain the yearly average heating value and orifice size required to fire each individual burner at 14,000 BTU/HR.

NOTE: Refer to the High Altitude Section of this manual and the National Fuel Gas Code for high altitude rate adjustment above 2,000 ft.
The importance of proper air flow over the heat exchanger cannot be over emphasized.

**NOTE:** Where the maximum airflow is expected to be over 1800 CFM, BOTH sides or the bottom must be used for the return air.

---

**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°F (4.5°-21°C), the middle of the rise range is 55°F (12.8°C). 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. This could cause injury or death and will void the manufacturer's warranty for this product.
MAINTENANCE

FILTERS

CAUTION

DO NOT OPERATE THE SYSTEM FOR EXTENDED PERIODS 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.

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. It is recommended that the blower motor and induced draft blower motor 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.

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. 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.

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MAINTENANCE

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 the advantages of continuous fan operation to the customer.

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 fine steel wool or Scotch Bright Pad 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. 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.

REPLACEMENT PARTS

Please visit www.rheemote.net for replacement parts information.
Below are two lists; a list of standard operating codes and a list of fault codes. The fault code list provides diagnostic and troubleshooting information to help determine the problem and fix it. Standard operating codes are not fault codes and the presence of a standard operating code indicates a no-fault condition.

NOTE: Verify display orientation is correct before interpreting fault codes. Otherwise, the fault codes may be upside-down. If a fault code or operating code is not on these lists, the display may be upside-down.

### TABLE 19
R96V NORMAL OPERATION CODES

<table>
<thead>
<tr>
<th>KEY CODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>This code is displayed anytime there is no fault present and no thermostat call present. The furnace is idle.</td>
</tr>
<tr>
<td>H or h</td>
<td>This code is displayed anytime there is a call for gas heat. The lower-case &quot;h&quot; is displayed when the thermostat is requesting low gas heat and the upper-case &quot;H&quot; is displayed when the thermostat is requesting high-stage gas heat.</td>
</tr>
<tr>
<td>C or c</td>
<td>This code is displayed anytime there is a call for cooling. The lower-case &quot;c&quot; is displayed when the thermostat is requesting low-stage cooling and the upper-case &quot;C&quot; is displayed when the thermostat is requesting high-stage cooling.</td>
</tr>
<tr>
<td>HP or hP</td>
<td>This code is displayed anytime there is a call for heat-pump heat. The lower-case &quot;hP&quot; is displayed when the thermostat is requesting low-stage heat-pump heat and the upper-case &quot;HP&quot; is displayed when the thermostat is requesting high-stage heat-pump heat.</td>
</tr>
<tr>
<td>F</td>
<td>This code is displayed anytime there is a call for continuous fan from the thermostat.</td>
</tr>
<tr>
<td>dF</td>
<td>This code indicates that the heat-pump is in defrost mode (dual-fuel systems only) and furnace is operating for defrost operation which is fixed at low-stage gas heating operation.</td>
</tr>
<tr>
<td>Cd or cd</td>
<td>This code indicates that there is a both cooling and dehumidification demand present at the same time. When dehumidification is active, the cooling airflow will be reduced in order to allow water to accumulate on the condenser thereby removing humidity from the conditioned environment. The lower-case &quot;cd&quot; is displayed when the thermostat is requesting low-cooling with dehumidification and the upper-case &quot;Cd&quot; is displayed when the thermostat is requesting high-stage cooling with dehumidification.</td>
</tr>
</tbody>
</table>
## TABLE 20
**R96V FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS**

### FAULT CODES

<table>
<thead>
<tr>
<th>FAULT CODE DISPLAYED AT DUAL SEVEN-SEGMENT DISPLAY OF CONTROL</th>
<th>DISPLAYED TEXT</th>
<th>STATUS</th>
<th>DESCRIPTION</th>
<th>EXPECTED OPERATION</th>
<th>CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>d1</td>
<td>NO MODEL DATA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STATUS: This is a critical fault. The furnace will not operate in any mode.</td>
<td></td>
<td>DESCRIPTION: This code is displayed anytime there is no model data at the furnace. The model data is electronically stored data that is used to define (among other things) blower operation. Without the model data, the furnace cannot function. Note that model data may be available even if there is no card attached to the furnace control. A missing memory card will display fault code &quot;d4&quot; if model data is available on the network.</td>
<td>EXPECTED OPERATION: No operation (including thermostat) will be permitted without the model data. The model data defines the IBM (Indoor Blower Motor) speed-torque curve. Without this information, the IBM cannot operate. Refer to the section of this manual titled &quot;INTEGRATED FURNACE CONTROL&quot; under the subsection titled &quot;MEMORY CARD&quot; for details on the hierarchy of use of multiple copies of model data and distribution (among other details) of model data.</td>
<td>CAUSE: Typically, the memory card will be missing from the furnace. In most cases, the cause of this fault will be the loss or disconnection of the original memory card from the furnace control (or I.F.C.). When the furnace control (or I.F.C.) is replaced, the memory card must be saved and installed in the replacement control.</td>
<td>SOLUTION: Replace the missing memory card into the connector labeled P6 on the furnace control (I.F.C.). If the original card can not be found, a replacement card can be ordered from ProStock. Be sure to order the correct memory card for the furnace. Note: Furnace power must be cycled off and then on again after replacing the card or the model data will not be read.</td>
</tr>
<tr>
<td>d4</td>
<td>NO VALID MODEL DATA ON MEMORY CARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STATUS: This is a non-critical fault. The furnace should operate in any mode.</td>
<td></td>
<td>DESCRIPTION: The memory card inserted into the slot at position P6 of the furnace control is corrupt and can not be used OR there is no memory card installed at all. However, a valid copy of model data for the furnace still resides in the furnace microprocessor.</td>
<td>EXPECTED OPERATION: model data from the memory card can not be used because it is invalid or not present at all. Operation should proceed as normal with this fault (d4) only being displayed during the standby mode.</td>
<td>CAUSE: This fault is displayed when there is no information on the memory card (blank), the card is not present or the memory card has corrupted and can not be properly read.</td>
<td>SOLUTION: Remove the memory card and replace with the original memory card from the furnace or the correct replacement memory card. Never replace the memory card of a furnace with a memory card from another furnace or component (e.g. condenser or air handler). Doing so could result in improper operation of the blower which may cause damage to the heat exchanger. If the original memory card for the furnace control is available and working, it must be used. A correct replacement memory card can be ordered from ProStock. Be sure to have the furnace model and serial number available when ordering.</td>
</tr>
<tr>
<td>d6</td>
<td>HORSEPOWER CONFLICT ON MEMORY CARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STATUS: This is a non-critical fault. The furnace should operate in any mode.</td>
<td></td>
<td>DESCRIPTION: The horsepower reported by the motor does not match the horsepower stored in memory in the model data of the memory card. However, the model data stored on the microprocessor of the furnace control does match the attached motor.</td>
<td>EXPECTED OPERATION: model data from the memory card can not be used because it is invalid. Operation should proceed as normal with this fault (d6) only being displayed during the standby mode.</td>
<td>CAUSE: There are two possible causes for this fault: (1) The blower motor has recently been replaced and the wrong horsepower motor was used. (2) The memory card or furnace control has recently been replaced and the wrong card or replacement control was used.</td>
<td>SOLUTION: Determine the correct motor and/or model data card for the furnace and replace the incorrect or damaged part with a new, correct part. Never replace the memory card of a furnace with a memory card from another furnace or component (e.g. condenser or air handler). Doing so could result in improper operation of the blower which may cause damage to the heat exchanger. If the original memory card for the furnace control is available and working, it must be used. A correct replacement memory card can be ordered from ProStock. Be sure to have the furnace model and serial number available when ordering.</td>
</tr>
</tbody>
</table>
### TABLE 20 (continued)
R90V FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

#### ONE-HOUR LOCKOUT

<table>
<thead>
<tr>
<th>STATUS:</th>
<th>This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION:</td>
<td>This fault is displayed under the following conditions:</td>
</tr>
<tr>
<td>1.</td>
<td>When a failed ignition has occurred four times in a row, the control enters one-hour lockout and fault codes “10” and “11” will be displayed alternately at the seven-segment display. See fault code 11 for a description on expected operation, causes and solutions for this fault code.</td>
</tr>
<tr>
<td>2.</td>
<td>After declaring a Water Sensed condition (heating operation is shut down due to this fault) several times consecutively. When the control enters lockout the fault codes “99” (Water Sensed) and “10” (soft lockout) will be displayed alternately at the seven-segment display. See fault code 59 for a description on expected operation, causes and solutions for this fault code.</td>
</tr>
<tr>
<td>3.</td>
<td>While the control has entered a one-hour lockout after declaring a dead blower after the main limit control has been open for more than 150 seconds, the fault codes “61” (Non-operational blower) and “10” (soft lockout) will be displayed alternately at the seven-segment display. Note: the dead blower fault and associated one-hour lockout will occur up to four times in one heat call. Upon declaring this fault for the fourth time in one heat call, the control will enter hard lockout requiring manual reset of power to the furnace. See fault code 61 for a description on expected operation, causes and solutions for this fault code.</td>
</tr>
<tr>
<td>4.</td>
<td>When IFC is in soft lockout and fault “93” is active, the fault code “93” is to be displayed alternately with the fault code “10” at the furnace seven-segment display. See fault code 93 for a description on expected operation, causes and solutions for this fault code.</td>
</tr>
<tr>
<td>5.</td>
<td>When flame is lost five times in a row, the control enters one-hour lockout and fault codes “10” and “13” will be displayed alternately at the IFC seven-segment display. See fault code 13 for a description on expected operation, causes and solutions for this fault code.</td>
</tr>
<tr>
<td>6.</td>
<td>While the control is in one-hour lockout due to an unexpected flame, the fault codes “14” (unexpected flame) and “10” (soft lockout) will be displayed alternately at the furnace seven-segment display. See fault code 14 for a description on expected operation, causes and solutions for this fault code.</td>
</tr>
</tbody>
</table>

#### FAILED IGNITION

<table>
<thead>
<tr>
<th>STATUS:</th>
<th>Up to three failed ignitions will not constitute a critical condition. Critical condition (with no heating operation) is only noted when the furnace has failed to ignite four or more times consecutively. After four failed ignition attempts, the IFC enters one-hour lockout and the dual faults “17” and “10” are alternately displayed at the IFC’s seven-segment display.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION:</td>
<td>This fault is displayed at the furnace control after the first failed ignition attempt. It continues to be displayed until successful ignition or the furnace control has failed to ignite four consecutive times. After four attempts, the status of the fault is elevated to “10” and the furnace control (or I.F.C.) reacts as described under description for the fault code “10”. Note: This fault will not be displayed to the homeowner on communicating systems unless it occurs at least three times within a single heat call. It will not be displayed to the homeowner after the first or even second failure. However, it will be displayed in the active fault screen of thermostat immediately after the first failure (and all subsequent failures) during a single heat call. Further, this fault (11) will only be logged into the fault buffer one time. It will not log more than once in the buffer.</td>
</tr>
<tr>
<td>EXPECTED OPERATION:</td>
<td>After the first failed ignition attempt, the fault (“11”) is displayed and the inducer will complete a 20 second post-purge followed by a second ignition attempt. This cycle will be repeated until gas heat is established or until the fourth failed ignition attempt. After the fourth failed attempt, the furnace control (IFC) will proceed to one-hour lockout.</td>
</tr>
<tr>
<td>CAUSE:</td>
<td>There can be several causes for a failed ignition attempt(s). The most common are:</td>
</tr>
<tr>
<td>(1)</td>
<td>The flame sense rod is unable to sense flame. It may need cleaning or may not be properly connected.</td>
</tr>
<tr>
<td>(2)</td>
<td>The gas valve may be turned off.</td>
</tr>
<tr>
<td>(3)</td>
<td>The igniter is not working properly. It may not be properly connected or the spark location may not be correct.</td>
</tr>
<tr>
<td>(4)</td>
<td>The flame control may not be working properly and may need to be replaced.</td>
</tr>
<tr>
<td>(5)</td>
<td>The flame may not be properly spreading from the first burner to the last.</td>
</tr>
<tr>
<td>SOLUTION:</td>
<td>The solution will depend on the cause. Solutions to noted causes (1) through (5) above are:</td>
</tr>
<tr>
<td>(1)</td>
<td>Clean or replace the flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). Make sure furnace ground is properly connected.</td>
</tr>
<tr>
<td>(2)</td>
<td>Turn the valve on.</td>
</tr>
<tr>
<td>(3)</td>
<td>Replace or reposition the igniter or check all connections and wire between the igniter and the furnace control (or I.F.C.).</td>
</tr>
<tr>
<td>(4)</td>
<td>Replace the furnace control.</td>
</tr>
<tr>
<td>(5)</td>
<td>Check the manifold pressure during ignition. For natural gas it should be approx. 3.5&quot; wc and for LP gas it should be approx. 10&quot; wc. If manifold pressure is good, watch the burner during ignition. If the first burner lights, but the second, third and so on do not light, the burner may need to be replaced.</td>
</tr>
</tbody>
</table>
### TABLE 20 (continued)

#### LOW FLAME SENSE

| STATUS: | The status of this fault is non-critical and furnace operation will continue as normal in heating (and all other) mode(s). If flame sense is low, the furnace control (or I.F.C.) may soon no longer be able to properly sense the flame and status of the problem may be elevated to the level of fault code "13" or fault "11" (if flame can not be sensed at all). |
| DESCRIPTION: | The flame sense current from the flame sense rod at the furnace control (or I.F.C.) is weak or marginal at best. |
| EXPECTED OPERATION: | All operation (including gas heat) will proceed as normal with only the fault code ("12") displayed at the furnace control (I.F.C.) and "LO FLAME SENSE" displayed in the fault area of a communicating thermostat. |
| CAUSE: | (1) The most common cause for low flame sense during heat operation is that the flame sense rod may need cleaning or may not be properly connected or wiring between the rod and the furnace control may be shorted or opened. |
| SOLUTION: | (1) Clean or replace the flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). |
| | (2) Reinstall or replace flame sensor and check wiring and connections. Also make sure the furnace is properly grounded. |

#### FLAME LOST AFTER ESTABLISHED

| STATUS: | Flame loss is not a critical fault. Subsequent ignition attempts will follow and normal operation should resume. However, a lost flame can often be followed by failed ignition attempts then a one-hour lockout. Once the status has reached one-hour lockout, the fault condition is critical (although attempts at ignition will be made again after the 1 hour lockout). |
| DESCRIPTION: | After a successful ignition trial, the flame (which was properly sensed) is no longer sensed. This can happen any time after successful ignition while a valid heat call is present. |
| EXPECTED OPERATION: | When flame is lost, the fault code ("13") is immediately displayed at the IFX SSD’s. The IBM (Indoor Blower Motor) is energized (if it was not already) at the correct speed (based on the demand from the thermostat) and completes a 90 second blower off delay. The IDM (Induced Draft Motor) remains energized at the most recent speed (based on the demand from the thermostat or as required for ignition cycle) for a 20 second post-purge. After both the post-purge and blower off delay are complete, the fault code ("13") is removed and a new attempt at ignition is made. Often, the new ignition attempt will fail and operation will proceed as though a failed ignition has occurred from that point (see fault code "1F"). Note: This fault will not be displayed to the homeowner on communicating systems unless it occurs at least three times within a single heat call. It will not be displayed to the homeowner after the first or even second failure. However, it will be displayed in the active fault screen of thermostat immediately after the first failure (and all subsequent failures) during a single heat call. Further, this fault (13) will only be logged into the fault buffer one time. It will not log more than once in the buffer. |
| CAUSE: | (1) The most common cause for low flame sense during heat operation is that the flame sense rod may need cleaning or may not be properly connected or wiring between the rod and the furnace control may be shorted or opened. |
| SOLUTION: | (1) Clean or replace the flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). |
| | (2) Reinstall or replace flame sensor and check wiring and connections. Also make sure the furnace is properly grounded. |
| | (3) Check that all burner assembly components are properly installed. Check for good seals between the burner and blower compartments. Insure that the combustion door gasket is in place and the door is properly installed and sealed. |

#### FLAME PRESENT WITH GAS VALVE OFF

| STATUS: | This is an extremely critical fault and should rarely (if ever) be seen in the field. The furnace will not operate with this fault present. |
| DESCRIPTION: | This fault indicates flame is present when it should not be. Flame is seen to be present when the gas valve is supposed to be off. |
| EXPECTED OPERATION: | When unexpected flame is sensed, the IBM (Indoor Blower Motor) is energized at maximum heat speed and IDM (Induced Draft Motor) is energized at high speed. Both will remain energized until the fault is cleared. Response to any thermostat call is not permitted until the fault is cleared. Note that the gas valve circuit should not have been energized when the unexpected flame was sensed. When the condition causing the fault is cleared, the IDM will complete a 20 second post-purge and the IBM will complete a 90 second blower off-delay. The control will then enter a one-hour lockout and display the fault codes "10" (one-hour lockout) and "14" (unexpected flame) alternately for the duration of the one-hour lockout. Operation is returned to normal after the lockout period. |
| CAUSE: | (1) Field mis-wiring of 24VAC to the gas valve main solenoid. |
| | (2) Faulty gas valve stuck in the "OPEN" position. |
| | (3) Faulty furnace control (signal improperly sensed when it should not be sensed at all). |
| SOLUTION: | (1) Wire properly. |
| | (2) Replace gas valve. |
| | (3) Replace furnace control. |
### TABLE 20 (continued)
#### R96V FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
<th>Expected Operation</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
</table>
| **Main Limit Open** | This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g., cooling) should function. | The main limit has opened or is sensed to be opened. This normally means that the temperature inside the heat exchanger area has gone above a certain predetermined critical value and heating operation is not permitted until the limit cools to within normal parameters. | | (1) No airflow  
(2) Insufficient airflow  
(3) Faulty limit control  
(4) Loose or faulty wiring  
(5) Dead (non-functional) blower  
(6) Input too high |
| **Halc Open** | This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g., cooling) should function. | This fault is displayed when the IFC does not sense continuity between pins 3 and 5 of connector P1 on the furnace control. Note: The fault code exists in the list of fault codes but the furnace as currently configured does not include an HALC control. There is a jumper wire in place of the control and, when the furnace control displays this fault, it generally means that the jumper wire is not making connection between the two pins on the control. | | (1) Repair the jumper between pins 3 and 5 of connector P1 on the furnace control. |
| **Line and Neutral Reversed or Poor Ground** | This is a critical fault. The furnace will not operate in gas heat or any other modes. | No heating or cooling operation will take place. | | (1) Line and neutral to the furnace have been interchanged at the furnace.  
(2) Line voltage and neutral have been interchanged at the disconnect or at the breaker box.  
(3) Furnace control cannot properly sense ground. |
| | | | | (1) Check voltage with meter and reverse line and neutral if necessary.  
(2) Check voltage with meter and reverse line and neutral if necessary.  
(3) Check ground wire inside furnace cabinet is attached to sheet metal, verify ground to furnace cabinet and at breaker box. |
### TABLE 20 (continued)
**R96V FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS**

<table>
<thead>
<tr>
<th>Fault Code</th>
<th>Description</th>
<th>Expected Operation</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPEN FUSE</strong></td>
<td>This is a critical fault. The furnace will not operate in any mode.</td>
<td>The fault code is displayed and no other operation can take place.</td>
<td>An electrical short from low voltage (24VAC) to ground or common has occurred.</td>
<td>Repair the short circuit condition and replace fuse.</td>
</tr>
<tr>
<td><strong>OVER-TEMPERATURE SWITCH (ROLL-OUT) OPEN</strong></td>
<td>This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function.</td>
<td>When the MRLC (Manually Reset Limit Control) circuit has been opened, the IBM (Indoor Blower Motor) is energized at maximum heating speed. The gas valve circuit is de-energized (if it was energized) and the IDM (Induced Draft Motor) is energized at high speed. Response to thermostat cooling calls will take place as normal with IBM energizing at the higher of the two blower speeds (high heat or cool) when a call for cooling is also present. When the fault is cleared, the IDM will remain energized for a 20 second post-purge and the IBM will remain energized for the user-selected blower off-delay period.</td>
<td>Insufficient ventilation through either the inlet or exhaust.</td>
<td>Replace faulty wiring.</td>
</tr>
<tr>
<td><strong>LOW PRESSURE SWITCH CLOSED, INDUCER OFF</strong></td>
<td>This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).</td>
<td>The low pressure control (or switch) should not be closed when the inducer is not running. If it is, this is a sign of a serious condition. The switch may be welded closed or purposely bypassed in the field. Before any heat cycle can begin, the pressure switch is tested to make sure that it is opened. The switch is ignored except in gas heating modes.</td>
<td>There will be no other operation than displaying of the fault code and diagnostic messages to the homeowner and technician. The fault code is only present during a heat call before pre-purge begins.</td>
<td>Replace low pressure control (switch).</td>
</tr>
</tbody>
</table>
### TABLE 20 (continued)

**R90V FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS**

#### LOW PRESSURE SWITCH OPEN, INDUCER ON HIGH SPEED

**STATUS:** This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).

**DESCRIPTION:** This fault indicates that the low pressure switch is open when the inducer is energized at high speed. The switch must close after the inducer is energized and before the ignition sequence can begin. The switch is ignored except in heating modes.

**EXPECTED OPERATION:**
1. **DISPLAYED BEFORE HEAT IS ESTABLISHED:** The IBM (Indoor Blower Motor) will not be energized. The fault code will not be displayed until the IDM (Induced Draft Motor) has been energized for a minimum of ten seconds. The IDM will remain energized at the high speed (high speed is default pre-purge speed) for a period of five minutes after the beginning of the pre-purge attempt. After five minutes, the IDM is de-energized and second attempt at pre-purge is made (as long as the heat call is still present). This cycle is repeated indefinitely until either the pressure switch closes or the heat call is lost.
2. **DISPLAYED AFTER HEAT IS ESTABLISHED:** If this fault is displayed after heat is established, the gas valve will be de-energized, the IBM will be energized (if not already energized) at the correct heat speed (determined by the firing rate required by the thermostat) and the IDM will remain energized at high speed. The IBM will complete a 90 second blow off-delay and the IDM will complete a 20 second post-purge (at high speed). After these delays, a new attempt at ignition will be made provided the call for heat is still present.

**CAUSE:**
1. Blockage or improper termination in either the inlet or exhaust vents.
2. The flue vent length and/or number of elbows exceeds the maximum number specified.
3. Faulty or disconnected inducer.
4. Faulty control board (inducer relay).
5. Loose or faulty wiring.
6. Disconnected, blocked, split or cut pressure switch hoses.
7. Wind gusts (sporadic).
8. Faulty pressure switch.

**SOLUTION:**
1. Check the vent system for blockage and proper termination and repair as necessary.
2. Check the specification sheets and/or installation instructions. Remove excess venting.
3. Repair or replace inducer and/or inducer wiring and/or electrical connections.
4. Replace control board.
5. Check wiring and connections. Replace and/or repair as necessary.
6. Replace hoses as necessary.
7. Insure proper termination and determine if high altitude kit may be necessary (see item 4)
8. Replace the pressure switch.

#### LOW PRESSURE SWITCH OPEN, INDUCER ON LOW SPEED

**STATUS:** This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).

**DESCRIPTION:** This fault indicates that the low pressure switch is open when the inducer is energized at low speed. Since the furnace only ignites at high fire, this condition should never be seen except after the blower on delay period of the ignition cycle and only after the furnace attempt to switch to low stage heating. The switch is ignored except in heating modes.

**EXPECTED OPERATION:** This fault is displayed only after heat is established and switched to low fire with the IBM (Indoor Blower Motor) energized at low speed. When this fault is displayed the gas valve will be de-energized, the IBM will remain energized at the low heat speed and the IDM (Induced Draft Motor) will remain energized at the low speed. The IBM will complete the user-selected blow off-delay (at low speed) and the IDM will complete a 20 second post-purge (at low speed). After these delays, a new attempt at ignition will be made provided the call for heat is still present.

**CAUSE:**
1. Blockage or improper termination in either the inlet or exhaust vents.
2. The flue vent length and/or number of elbows exceeds the maximum number specified.
3. Faulty or disconnected inducer.
4. Faulty control board (inducer relay).
5. High altitude kit not installed in areas of high elevation.
6. Loose or faulty wiring.
7. Disconnected, blocked, split or cut pressure switch hoses.
8. Wind gusts (sporadic).

**SOLUTION:**
1. Check the vent system for blockage and proper termination and repair as necessary.
2. Check the specification sheets and/or installation instructions. Remove excess venting.
3. Repair or replace inducer and/or inducer wiring and/or electrical connections.
4. Replace control board.
5. Check elevation of the installation and consult the specifications for the furnace to determine if a high altitude kit is needed. Install proper kit as necessary.
6. Check wiring and connections. Replace and/or repair as necessary.
7. Replace hoses as necessary.
8. Insure proper termination and determine if high altitude kit may be necessary (see item 4)
9. Replace the pressure switch.
### TABLE 20 (continued)

#### R9EV FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

<table>
<thead>
<tr>
<th>Code</th>
<th>Status</th>
<th>Description</th>
<th>Expected Operation</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
</table>
| **55** | **HIGH PRESSURE SWITCH CLOSED, INDUCER OFF** | This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g., cooling) should function if present simultaneously with a heating call (e.g., defrost call in dual-fuel mode). The high pressure switch (or switch) should not be closed when the inducer is not running. If it is, this is a sign of a serious condition. The switch may be welded closed or purposely bypassed in the field. | There will be no other operation than displaying of the fault code and diagnostic messages to the homeowner and technician. The fault code is only present during a heat call before pre-purge begins. | (1) Faulty switch.  
(2) Pressure switch physically bypassed in the field.  
(3) Loose or faulty wiring.  
(4) Abnormally high negative pressure present on vent system without inducer running. | (1) Replace high pressure control (switch).  
(2) Remove bypass and restore correct operation. Determine reason for bypass (e.g., vent length too long) and correct issue. Notify homeowner and proper authorities of illegale tampering if necessary.  
(4) Check for proper venting and terminations as defined in the furnace installation instructions. |
| **57** | **HIGH PRESSURE SWITCH OPEN, INDUCER ON HIGH SPEED** | This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g., cooling) should function if present simultaneously with a heating call (e.g., defrost call in dual-fuel mode). If this fault is experienced during high heat operation and the low pressure switch remains engaged, the furnace will switch to low fire heat and continue to run (if possible) to try to satisfy the thermostat. | This fault indicates that the high pressure switch is open when the inducer is energized at high speed. This fault can be displayed any time during the heat call except during low heat call and only after the pre-purge and blower on delays are complete. | (1) Blockage or improper termination in either the inlet or exhaust vents.  
(2) The flue vent length and/or number of elbows exceeds the number specified.  
(3) Faulty or disconnected inducer.  
(4) Faulty control board (inducer relay).  
(5) High altitude kit not installed in areas of high elevation.  
(6) Loose or faulty wiring.  
(7) Disconnected, blocked, split or cut pressure switch hoses.  
(8) Wind gusts (sporadic).  
(9) Faulty pressure switch. | (1) Check the vent system for blockage and proper termination and repair as necessary.  
(2) Check the specifications sheets and/or installation instructions. Remove excess venting.  
(3) Repair or replace inducer and/or inducer wiring and/or electrical connections.  
(4) Replace control board.  
(5) Check elevation of the installation and consult the specifications for the furnace to determine if a high altitude kit is needed. Install proper kit as necessary.  
(6) Check wiring and connections. Replace and/or repair as necessary.  
(7) Replace hoses as necessary.  
(8) Insure proper termination and determine if high altitude kit may be necessary (see item 4).  
(9) Replace the pressure switch. |
| **58** | **WATER CIRCUIT OPEN** | The IFC cannot detect electrical continuity between pins 1 and 2 of connector P4 of the furnace control. The IFC looks for continuity between these pins to determine if the water sensors (2) are present in the circuit. When both sensors are present and properly connected and wiring is not damaged, there should be electrical continuity between these pins. | No gas heating operation can proceed and the fault is displayed. All other modes (e.g., cooling) of operation should operate as normal. | (1) Wiring has been damaged between the control or sensor.  
(2) Connection of P4 at the IFC or at the water sensors is not properly made.  
(3) Water sensor has been removed. | (1) Repair or replace wiring.  
(2) Repair connections or replace wiring or sensors or controls as necessary.  
(3) Replace missing water sensor. |
**TABLE 20 (continued)**

**R90V FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS**

<table>
<thead>
<tr>
<th>WATER SENSED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATUS:</strong> This is a critical fault experienced by the furnace. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if a alarm is present.</td>
</tr>
<tr>
<td><strong>DESCRIPTION:</strong> The IFC has detected current flowing from pin(s) 1 and/or 2 of connector P4 of the furnace control. The IFC looks for current flow from these pins to determine if water is present in the collector box. When water is present, the sensor will pass a small amount of electrical current to the sheet metal of the furnace. This current flow will notify the IFC that water is present.</td>
</tr>
<tr>
<td><strong>Note:</strong> The condition must be present continuously for at least ten seconds before the IFC will declare the fault.</td>
</tr>
<tr>
<td><strong>EXPECTED OPERATION:</strong> No gas heating operation can proceed and the fault is displayed. All other modes (e.g. cooling) of operation should operate as normal.</td>
</tr>
<tr>
<td><strong>CAUSE:</strong></td>
</tr>
<tr>
<td>(1) A blocked condensate drain or the drain trap has become blocked and cannot allow condensate water to flow properly.</td>
</tr>
<tr>
<td>(2) Wiring to the sensors has been damaged and exposed wiring is touching the furnace sheet metal.</td>
</tr>
<tr>
<td>(3) Water sensor has been removed from the collector box with wires still attached and the metal probe is touching the sheet metal portion of the furnace.</td>
</tr>
<tr>
<td><strong>SOLUTION:</strong></td>
</tr>
<tr>
<td>(1) Remove/Repair drain blockage.</td>
</tr>
<tr>
<td>(2) Replace/Repair wiring between IFC and both sensors.</td>
</tr>
<tr>
<td>(3) Return sensor(s) to proper location in the collector box.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>BLOWER FAULT - BLOWER CAN STILL RUN</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATUS:</strong> This is a non-critical fault experienced by the furnace. All operations (including thermostat calls) should continue as normal with no perceivable difference in operation.</td>
</tr>
<tr>
<td><strong>DESCRIPTION:</strong> A blower fault which is non-critical allows the blower to continue to run but at less-than-optimal conditions.</td>
</tr>
<tr>
<td><strong>EXPECTED OPERATION:</strong> All (including thermostat) operation should continue as normal. Blower operation may be slightly compromised but will continue.</td>
</tr>
<tr>
<td><strong>CAUSE:</strong></td>
</tr>
<tr>
<td>(1) The blower has hit the maximum speed or torque limit specified by the manufacturer or is running at the temperature limit because the static pressure is too high.</td>
</tr>
<tr>
<td><strong>SOLUTION:</strong></td>
</tr>
<tr>
<td>(1) The static pressure is too high because the ductwork is improperly designed or is restricted for some other reason or the filters need cleaning or replacing. Remove the obstruction or repair the duct so that static pressure does not exceed published values in the specification sheets or installation instructions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>BLOWER FAULT - MOTOR CANNOT RUN</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATUS:</strong> This is a critical fault. The furnace will not operate in any mode.</td>
</tr>
<tr>
<td><strong>DESCRIPTION:</strong> The blower has failed critically or there is a critical motor fault - such as thermal limit trip that prevents the blower motor from running.</td>
</tr>
<tr>
<td><strong>EXPECTED OPERATION:</strong> If the furnace was in heating operation when this fault occurred, blower operation will immediately stop and the furnace will shut down normally with post-purge at the correct speed. After the post purge (or immediately if no heat call was present), no other operation (including thermostat calls) will occur until this fault is cleared. This fault may be displayed in heating or cooling modes and may also be displayed in heating mode after the main limit control has been opened four times consecutively for more than 150 seconds (2min:30sec) each time. If this happens, the IFC determines that the motor and/or blower is not functional and enters a hard lockout condition requiring repair of the blower/motor and manual reset of power to the furnace.</td>
</tr>
<tr>
<td><strong>CAUSE:</strong></td>
</tr>
<tr>
<td>(1) The motor has tripped on thermal limit because of a restriction or bearing failure.</td>
</tr>
<tr>
<td>(2) The motor Power Factor Correction (P.F.C.) choke is faulty and needs replacing.</td>
</tr>
<tr>
<td>(3) The furnace model data is faulty or corrupted.</td>
</tr>
<tr>
<td>(4) Wiring to the motor and/or P.F.C. has become compromised.</td>
</tr>
<tr>
<td>(5) The blower wheel has become damaged or is not properly attached to the motor shaft.</td>
</tr>
<tr>
<td>(6) The motor has failed catastrophically.</td>
</tr>
<tr>
<td><strong>SOLUTION:</strong></td>
</tr>
<tr>
<td>(1) Remove obstruction or replace motor.</td>
</tr>
<tr>
<td>(2) Replace the Power Factor Correction choke.</td>
</tr>
<tr>
<td>(3) Replace the furnace memory card with the correct replacement part from ProStock.</td>
</tr>
<tr>
<td>(4) Inspect and replace or repair wiring and/or connectors to the motor and/or P.F.C. as necessary.</td>
</tr>
<tr>
<td>(5) Replace the blower wheel and/or attach the blower wheel to the motor shaft properly.</td>
</tr>
<tr>
<td>(6) Replace the motor.</td>
</tr>
</tbody>
</table>
### TABLE 20 (continued)

**R96V FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS**

<table>
<thead>
<tr>
<th>Fault Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td><strong>BLOWER CUTBACK</strong></td>
</tr>
<tr>
<td></td>
<td><strong>STATUS:</strong> This is a non-critical fault experienced by the furnace. All operations (including thermostat calls) should continue as normal with no perceivable difference in operation.</td>
</tr>
<tr>
<td></td>
<td><strong>DESCRIPTION:</strong> The blower motor is operating at the highest rpm or torque that specifications allow but the application requires more torque or speed in order to get the desired airflow under the current static pressure conditions. The motor will continue to operate because internal software will prevent operation above the permitted range. However, a fault is sent to the furnace control (or I.F.C.) from the motor.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This fault will not be displayed after the first three minutes of blower operation after power reset. Further, this fault will not be logged in the fault buffer or fault history after the first hour of operation and will only be logged into the fault buffer a maximum of one time. This code (66) indication is intended as a tool to notify the installer of inadequate airflow due to excessive static pressure in the duct of the system. The code is not intended to be a fault code. It is merely an operating indicator.</td>
</tr>
<tr>
<td></td>
<td><strong>EXPECTED OPERATION:</strong> All (including thermostat) operation should continue as normal. Blower operation may be slightly compromised but will continue.</td>
</tr>
<tr>
<td></td>
<td><strong>CAUSE:</strong></td>
</tr>
<tr>
<td></td>
<td>(1) The blower has hit the maximum speed or torque limit specified by the manufacturer because the static pressure is too high.</td>
</tr>
<tr>
<td></td>
<td><strong>SOLUTION:</strong></td>
</tr>
<tr>
<td></td>
<td>(1) The static pressure is too high because the ductwork is improperly designed or is restricted for some other reason or the filter needs cleaning or replacing. Remove the obstruction or repair the duct so that static pressure does not exceed published values in the specification sheets or installation instructions for the furnace.</td>
</tr>
<tr>
<td>68</td>
<td><strong>NO BLOWER COMMUNICATIONS</strong></td>
</tr>
<tr>
<td></td>
<td><strong>STATUS:</strong> This is a critical fault. The furnace will not operate in any mode.</td>
</tr>
<tr>
<td></td>
<td><strong>DESCRIPTION:</strong> The furnace control (I.F.C.) cannot communicate with the blower motor.</td>
</tr>
<tr>
<td></td>
<td><strong>EXPECTED OPERATION:</strong> If the furnace was in heating operation when this fault occurred, the gas valve will immediately close (flame will be lost). IBM (Indoor Blower Motor) operation will immediately stop and the furnace will shut down normally (except without IBM operation) with IOM (Induced Draft Motor) post-purge at the correct speed. After the post purge (or immediately if no heat call was present), no other operation (including thermostat calls) will occur until this fault is cleared.</td>
</tr>
<tr>
<td></td>
<td><strong>CAUSE:</strong></td>
</tr>
<tr>
<td></td>
<td>(1) The wires between the blower motor have been disconnected or there is a poor connection.</td>
</tr>
<tr>
<td></td>
<td>(2) There is no line voltage to the motor.</td>
</tr>
<tr>
<td></td>
<td>(3) The furnace model data is faulty or corrupted.</td>
</tr>
<tr>
<td></td>
<td>(4) The motor has failed catastrophically.</td>
</tr>
<tr>
<td></td>
<td><strong>SOLUTION:</strong></td>
</tr>
<tr>
<td></td>
<td>(1) Check wiring, connectors and terminals - repair or replace as necessary.</td>
</tr>
<tr>
<td></td>
<td>(2) Check line voltage wiring, connectors and terminals to the Power Factor Correction choke and ECM motor. Repair and replace as necessary.</td>
</tr>
<tr>
<td></td>
<td>(3) Replace the furnace memory card with the correct replacement part from ProStock.</td>
</tr>
<tr>
<td></td>
<td>(4) Replace the motor.</td>
</tr>
<tr>
<td>93</td>
<td><strong>INTERNAL CONTROL FAULT DETECTED</strong></td>
</tr>
<tr>
<td></td>
<td><strong>STATUS:</strong> This is a critical fault. The furnace will not operate in any mode of operation.</td>
</tr>
<tr>
<td></td>
<td><strong>DESCRIPTION:</strong> This is a severe fault that should rarely (if ever) be discovered in the field. It is an indicator of an internal microprocessor fault on the furnace control (or I.F.C.) or voltage applied to the main gas valve solenoid where there should be none.</td>
</tr>
<tr>
<td></td>
<td><strong>EXPECTED OPERATION:</strong> If possible, if the furnace was in heating operation when this fault occurred, the gas valve will immediately close (flame will be lost). IBM (Indoor Blower Motor) operation will immediately stop and the furnace will shut down normally (except without IBM operation) with IOM (Induced Draft Motor) post-purge at the correct speed. After the post purge (or immediately if no heat call was present), no other operation (including thermostat calls) will occur until this fault is cleared. However, this fault may also indicate an internal microprocessor failure. This may mean that the heat call will not end as expected and that all outputs will be de-energized and gas valve closed immediately when the fault is sensed.</td>
</tr>
<tr>
<td></td>
<td><strong>CAUSE:</strong></td>
</tr>
<tr>
<td></td>
<td>(1) 24VAC or similar voltage applied to the main gas valve solenoid circuit unexpectedly.</td>
</tr>
<tr>
<td></td>
<td>(2) Furnace control software test failure - failed furnace control (or I.F.C.).</td>
</tr>
<tr>
<td></td>
<td><strong>SOLUTION:</strong></td>
</tr>
<tr>
<td></td>
<td>(1) Check for miswiring in the furnace.</td>
</tr>
<tr>
<td></td>
<td>(2) Replace the furnace control (or I.F.C.).</td>
</tr>
<tr>
<td>99</td>
<td><strong>REMOTE FAULTS RESET PERFORMED</strong></td>
</tr>
<tr>
<td></td>
<td><strong>DESCRIPTION:</strong> This is a notification that fault codes in the fault buffer have been reset.</td>
</tr>
</tbody>
</table>
DIAGNOSTICS AND TROUBLESHOOTING

LOCKOUT AND REPLACING THE FURNACE CONTROL

All lockout conditions can be cleared immediately provided that the original fault causing the lockout is cleared and power to the unit is cycled off and then back on again or (soft lockout only) if a heat call is cycled off for greater than 2 seconds but less than 20 seconds.

The furnace control will not initiate a heat cycle during any lockout condition. A call for compressor or continuous fan will generally be responded to but control will display the lockout error fault code instead of the “C” (for compressor) or “F” (for Continuous fan).

FIVE-MINUTE LOCKOUT

A five minute “soft” lockout will be initiated if the low pressure switch fails to close after 60 seconds of continuous inducer operation at the beginning of a normal heat cycle (pressure switch proving period). The seven-segment display will display the appropriate fault. Lockout will automatically be reset after five minutes.

ONE-HOUR LOCKOUT

A one hour “soft” lock out will be initiated when:
- Flame has not been detected after four ignition trials.
- Flame has been lost for five times in one heat call.
- Undesired flame has been detected. The one-hour period will commence after flame is no longer detected.
- Dead Blower has been detected (main limit circuit open for more than 150 seconds)
- When voltage has unexpectedly been detected on the gas valve circuit and voltage goes away when inducer is shut off.
- If a Water Sensed condition is detected once during heat call (heat cycle terminated in response to fault) and then clears and then is detected again within 5 minutes of the next heat attempt (same heat call).

The seven-segment display will alternately display “10” and the code number for the fault causing the lockout. Lockout will automatically be reset after one hour.

HARD LOCKOUT

Three conditions shall cause a hard lockout:
1. The control senses an unspecified internal fault. Fault code “93” is set and displayed. This lockout condition cannot be reset by cycling the heat call.
2. Voltage is detected unexpectedly on the gas valve contacts (welded relay) and will not clear by cycling the inducer. Fault code “93” is set and displayed. This lockout condition cannot be reset by cycling the heat call.
3. The furnace control will declare that the blower motor is inoperable (dead) if the main limit control has been open for more than 150 seconds. Gas heating is terminated. However, the control continues to try to operate heating for up to four attempts in case the blower motor starts working again. If a dead blower has been declared four times in one heat call, the furnace control enters a hard-lockout. Fault code “61” is set and displayed. This lockout condition CAN be reset by cycling the heat call.

REPLACING THE FURNACE CONTROL

In the event that the furnace control must be replaced, the memory card must be removed from the original furnace control and retained with the furnace. A plastic tether with a note wrapped around the tether is used to remind the technician not to remove the card from the furnace. Use this card to insert into the memory card connector labeled P6 of the replacement control board. Failure to save and connect the memory card properly to the replacement control may result in no operation or undesired operation of the furnace.

When replacing the furnace control, be sure to match the dipswitch settings of the original control on the replacement.

DO NOT CUT THE PLASTIC WIRE TIE USED AS A TETHER TO THE ATTACHED MEMORY CARD. DOING SO WILL DEFEAT THE PURPOSE OF RETAINING THE MEMORY CARD – WHICH COULD LEAD TO A LOSS OF CRITICAL DATA NECESSARY TO OPERATE THE FURNACE. THE CARD MUST STAY WITH THE FURNACE – EVEN WHEN THE FURNACE CONTROL (IFC) MUST BE REPLACED. NEVER USE A CONTROL BOARD TAKEN FROM ANOTHER FURNACE AS A REPLACEMENT CONTROL FOR THIS FURNACE. FURNACE CONTROLS TAKEN FROM OTHER FURNACES MAY CONTAMINATE THE SYSTEM WITH THE WRONG MODEL DATA WHICH CAN ONLY BE FIXED BY REPLACING THE MEMORY CARD WITH THE ORIGINAL MEMORY CARD FROM THE ORIGINAL FURNACE OR A REPLACEMENT MEMORY CARD DESIGNED FOR THE ORIGINAL FURNACE.

DIAGNOSING BLOWER MOTOR ISSUES

If the main circulating blower motor will not operate when it should, there are some different methods for diagnosing the problem.
DIAGNOSING BLOWER MOTOR ISSUES

1. MOTOR POWER AND COMMUNICATIONS ISSUES (FAULT CODE “68”)

Is the motor communicating properly with the furnace control? If not, the fault code “68” will be displayed any time there is a call for cooling, heating or continuous fan. To determine the cause of this issue, follow these steps:

A. Remove the line voltage connector from the motor. This is the 5-pin connector. With the door switch closed, verify that there is 115-120VAC between pins 4 and 5 of the connector (see photos in Figure 59B). If no line voltage is detected, check the wiring and correct the issue. Line voltage should be present at these pins any time the furnace is powered. Make sure that the pins of the connector are fully seated in the housing to ensure good contact with the connection at the motor. When voltage is confirmed at these pins, replace the connector on the motor.

B. Remove the motor control connector from the furnace control at P5 and apply 24VAC to pins 3 & 4 (see photo). With the door switch closed (motor powered) and 24VAC on pins 3 & 4, the motor should start operating at 75% of capacity. If the motor is operating at a good speed, it is likely not the motor that is the problem. If the motor is not operating, verify that the control wiring between the motor and furnace control (to P5) is good and that all the pins on both ends are fully seated. If the wiring connections looks good, and the motor still will not operate, the motor likely needs to be replaced.

FIGURE 59
LINE VOLTAGE AND LOW VOLTAGE CONNECTIONS TO THE COMMUNICATING MOTOR
DIAGNOSTICS AND TROUBLESHOOTING

DIAGNOSING BLOWER MOTOR ISSUES

2. OVERSPEED OPERATION (CODE “66”)
   Note: This code will only be displayed during the first three minutes of blower operation and then only if the call for fan is great enough to force the motor into speed limit.
   A. Is the duct work of the system restrictive or confined? Or, maybe many (or all) of the supply registers are closed in the duct system. If so, the motor may indicate that it is operating in power limit under certain conditions by displaying code “66”. Remove the restrictions or reconfigure the duct work to avoid this code.
   B. Is the motor set-screw not tightened to the motor shaft? This may cause erratic motor operation and cause the furnace to display a “66” fault code. Further, airflow will be low or air may not be moving at all.

3. INTERNAL ERROR – MOTOR UNABLE TO OPERATE (FAULT CODE “61”)
   If the blower motor is able to communicate with the furnace control but is experiencing an internal issue – such as overheating, the fault code “61” will be displayed. Internal overloading may reset once the condition causing the problem has been removed. However, it is likely that the motor will need to be replaced.
   A. Is the motor wheel blocked by an obstruction? If so, the motor may be in locked-rotor state and the furnace control will report fault code “61”. Remove the obstruction and try to operate the motor again. If the motor continues to fail, it may be permanently damaged and may need to be replaced.
   B. Is the motor overheating? If so, it may report an overheat condition to the furnace control and the control will report fault code “61”. Determine the cause of overheating and repair. Try to operate the motor again. If the motor continues to fail, it may be permanently damaged and may need to be replaced.

4. INTERNAL ERROR – MOTOR ABLE TO OPERATE (FAULT CODE “60”)
   This is a low-level fault that is not likely to be displayed often. Operation will continue as normal but fault code will be displayed. Long-term permanent damage to the motor is not expected.
FIGURE 61 (continued)
2-TAGE FURNACE TROUBLESHOOTING CHART

From previous page.

Does I.B.M. energize at low speed?

YES

Does I.F.C. and I.D.M. low speed?

NO

**System will attempt to light 4 times. Voltage is present at gas valve for only 7 seconds during each ignition trial. System will enter a 1 hour lockout after 4 attempts.**

END

STEADY OFF

High-mode troubleshooting

Troubleshooting