

INSTALLATION INSTRUCTIONS AND HOMEOWNER'S MANUAL:
GAS FIRED FURNACE 2-STAGE ECM



By:
INNOVAIR
SOLUTIONS



GAS FURNACE
MULTIPOSITION

Models:

C15-2-V

C30-2-V

C45-2-V

C60-2-V

C75-2-V

C105-2-V*

C120-2-V*



! CAUTION

Outdoor design temperature below 5°F (-15°C) could cause blockage of the exhaust. Refer to section 7.2 for more details.

Models marked with * can only be sold in Quebec, Canada

INSTALLER / SERVICE TECHNICIAN:

Use the information in this manual for the installation/servicing of the furnace and keep the document near the unit for future reference.

HOMEOWNER: Please keep this manual near the furnace for future reference.

Manufactured by: **Dettson Industries Inc. Sherbrooke, Qc, Canada** www.dettson.com

Gas furnace manufactured on or after May 1, 2017 are not permitted to be used in Canada for heating of buildings or structures under construction

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REQUIRED NOTICE FOR MASSACHUSETTS INSTALLATIONS - IMPORTANT

The Commonwealth of Massachusetts requires compliance with regulation 248 CMR as follows:

5.08: Modifications to NFPA-54, Chapter 10. Revise 10.8.3 by adding the following additional requirements:

For all side wall horizontally vented gas fuelled 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:

Installation of Carbon Monoxide Detectors

At the time of installation of the side wall horizontal vented gas fuelled equipment, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery backup is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gas fitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fuelled equipment. It shall be the responsibility of the property owner to secure the services of qualified license professionals for the installation of hard wired carbon monoxide detectors.

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

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

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

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 fuelled heating appliance or equipment. The sign shall read, in print size no less than in-half (1/2) inch in size, "gas vent directly below. Keep clear of all obstruction".

INSPECTION: the state of local gas inspector of the side wall horizontally vented gas fuelled 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:

EXEMPTION: the following equipment is exempt from 248 CMR 5.08(2) (a) 1 through 4:

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

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

MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM PROVIDED

When the manufacturer of product approved side wall horizontally vented gas equipment provides a venting system design or venting system component with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

Detailed instructions for the installation of the venting system design or the venting system components; and a complete parts list for the venting system design or venting system.

MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM PROVIDED

When the manufacturer of product approved side wall horizontally vented gas fuelled equipment does not provide the parts or venting the flue gases, but identifies "special venting system", the following requirements shall be satisfied by the manufacturer:

The referenced "special venting system" shall be product approved by the board, and the instruction for that system shall include a parts list and detailed installation instructions.

A copy of all installation instructions for all product, approved side wall horizontally vented gas fuelled equipment, all venting instructions, all part s lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

For questions regarding these requirements, please contact the Commonwealth of Massachusetts board of State Examiners of Plumbers and Gas Fitters, 239 Causeway Street, Boston, MA, 02114, tel.: 617 727-9952.

FOR CALIFORNIA RESIDENT

For installation in SCAQMD only: This furnace does not meet the SCAQMD Rule 1111 14ng/J NOx emission limit, and thus is subject to a mitigation fee of up to \$450. This furnace is not eligible for the Clean Air Rebate Program: www.CleanAirFurnaceRebate.com
The efficiency is AHRI efficiency rating certified. This furnace meets California Air Quality Management District emission requirements.

1 SAFETY

1.1 SAFETY LABELING AND WARNING SIGNS

The words **DANGER**, **WARNING** and **CAUTION** are used to identify the levels of seriousness of certain hazards. It is important that you understand their meaning. You will notice these words in the manual as follows:

 **DANGER**
Immediate hazards which **WILL** result in death or serious bodily and/or material damage.

 **WARNING**
Hazards or unsafe practices which **CAN** result in death or serious bodily and /or material damage.

 **CAUTION**
Hazards or unsafe practices which **CAN** result in minor bodily and /or material damage.

1.2 IMPORTANT INFORMATION

 **WARNING**
Non-observance of the safety regulations outlined in this manual will potentially lead to consequences resulting in death, serious bodily injury and/or property damage.

 **WARNING**
Installation and repairs performed by unqualified persons can result in hazards to them and to others. Installations must conform to local codes or, in the absence of such codes, to codes of the country having jurisdiction.
The information contained in this manual is intended for use by a qualified technician, familiar with safety procedures and who is equipped with the proper tools and test instruments.
Failure to carefully read and follow all instructions in this manual can result in death, bodily injury and/or property damage.

1. It is the homeowner's responsibility to engage a qualified technician for the installation and subsequent servicing of this furnace;
2. Do not use this furnace if any part of it was under water. Call a qualified service technician immediately to assess the damage and to replace all critical parts that were in contact with water;

3. Do not store gasoline or any other flammable substances, such as paper or carton, near the furnace;
4. Do not stack items or boxing within the required clearances to combustible materials specified in Table 2;
5. Never block or otherwise obstruct the filter and/or return air openings;
6. Ask the technician installing your furnace to show and explain to you the following items:
 - The main disconnect switch or circuit breaker;
 - The gas shut off valve;
 - The air filter and how to change it (at least twice a year);
7. Before calling for service, be sure to have the information of section 11 of your manual close by in order to be able to provide the contractor with the required information, such as the model and serial numbers of the furnace.

 **WARNING**
Failure to follow this warning could result in dangerous operation, personal injury, death, or property damage. Improper installation, adjustment, servicing or repair can cause carbon monoxide poisoning, explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified service agency, local gas supplier, or your distributor for information or assistance. The qualified service agency must use only factory authorized and listed kits or accessories when modifying this product.

 **WARNING**
INJURY HAZARD
Ignoring this warning could result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts, and servicing furnaces

1.3 SAFETY CONSIDERATION

Untrained personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on heating equipment, observe precautions in literature, on tags, and on labels attached to or shipped with the furnace. Other safety precautions may apply.

These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances, especially those that may not have kept up with changing residential construction practices. We require these instructions as a minimum for a safe installation.

Follow all safety codes. Wear safety glasses, protective clothing and work gloves. Have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in the literature and attached to the unit.

1. Use only with type of gas approved for this furnace. Refer to the furnace rating plate and section 5 : GAS SUPPLY

AND PIPING.

2. Install this furnace only in a location and position as specified in section 3 : INSTALLATION.
3. Provide adequate combustion and ventilation air to the furnace as specified in section 7 : VENTING AND COMBUSTION AIR PIPING.
4. Combustion products must be discharged outdoors. Connect this furnace to an approved vent system only, as specified in section 7 : VENTING AND COMBUSTION AIR PIPING.
5. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified in section 5 : GAS SUPPLY AND PIPING.
6. Always install furnace to operate within the furnace's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified in section 4 : DUCT INSTALLATION of these instructions. See furnace rating plate.
7. When a furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by duct(s) sealed to the furnace casing and terminating outside the space containing the furnace. See section 4 : DUCT INSTALLATION.
This furnace may be installed, with a two pipe sealed combustion configuration, in a space utilized as part of the return air supply. A filter must be installed at the return opening of the furnace and a grill should be installed in the space to allow proper circulation of air.
8. Gas furnace manufactured on or after May 1, 2017 are not permitted to be used in Canada for heating of buildings or structures under construction.
9. A gas-fired furnace for installation in a residential garage must be installed as specified in the WARNING box below:

WARNING

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD
Improper servicing could result in dangerous operation, serious injury, death or property damage.
-Before servicing, disconnect all electrical power to furnace.
-When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
-Verify proper operation after servicing.

WARNING

FIRE, INJURY OR DEATH HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

When the furnace is installed in a residential garage, the burners and ignitions sources must be located at least 18 in. (457 mm) above the floor. The furnace must be located or protected to avoid damage by vehicles. When the furnace is installed in a public garage, airplane hangar, or other building having a hazardous atmosphere, the furnace must be installed in accordance with the NFPA 54/ANSI Z223.1-2009 or CAN/CSA B149.2-2010.

Do not install the furnace on its back or hang furnace with control compartment facing downward. Safety control operation will be adversely affected. Never connect return air duct to the back of the furnace.

WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death. The operation of exhaust fans, kitchen ventilation fans, clothes dryers, attic exhaust fans or fireplaces could create a **NEGATIVE PRESSURE CONDITION** at the furnace. Make-up air **MUST** be provided for the ventilation devices, in addition to that required by the furnace.

WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death. The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:

1. Seal any unused openings in venting system;
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the Natural Gas and Propane Installation Code, CSA B149.1 and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition;
3. As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building;
4. Close fireplace dampers;
5. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan;
6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously;
7. Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle;
8. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or Natural Gas and Propane Installation code, CSA B149.1;
9. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use;

1.4 DETECTION SYSTEMS

It is recommended that carbon monoxide detectors be installed wherever oil or gas fired heaters are used. Carbon monoxide can cause bodily harm or death. For this reason, agency approved carbon monoxide detectors should be installed in your residence and properly maintained to warn of dangerously high carbon monoxide levels.

Also, the house should be equipped with approved and properly

maintained fire extinguishers.

Your unit is equipped with safety devices that can prevent it from functioning when anomalies are detected such as a blocked venting system.

1.5 DANGER OF FREEZING

CAUTION

FROZEN AND BURST WATER PIPE HAZARD

Failure to protect against the risk of freezing may result in property damage. Special precautions **MUST** be made if installing furnace in an area which may drop below freezing. This can cause improper operation or damage to equipment. If furnace environment has the potential of freezing, the drain trap and drain line must be protected.

CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in burst water pipes and/or property damage. If a condensate pump is installed, a clogged condensate drain or a failed pump may cause the furnace to shut down. Do not leave the home unattended during freezing weather without turning off water supply and draining water pipes or otherwise protecting against the risk of frozen pipes. Ensure all condensate drain connections are secured and liquid tight. Use the furnished tube clamps and verify tightness

Table 1: Codes and Standards

2 INTRODUCTION

This multiposition Category IV condensing furnace is CSA design certified direct vent (2 pipes) or non-direct vent (1 pipe). The furnace is factory shipped for use with natural gas. The furnace can be converted in the field for use with propane gas when a factory supplied conversion kit is used. Refer to the furnace rating plate for conversion kit information and table 26

This furnace is designed for minimum continuous return air temperature of 60 °F (16 °C) or intermittent operation down to 55 °F (13 °C) such as when used with a night setback thermostat. Return air temperature must not exceed 80 °F (27 °C). Failure to follow these return air temperature limits may affect reliability of heat exchangers, motors, and controls. The furnace should be sized to provide at least 100 % of the design heating load requirement. Heating load estimates can be made using approved methods available from Air Conditioning Contractors of America (Manual J); American Society of Heating, Refrigerating, and Air Conditioning Engineers; or other approved engineering methods. Excessive over sizing of the furnace could cause the furnace and/or vent to fail prematurely.

2.1 CODES AND STANDARDS

Follow all national and local codes and standards in addition to these instructions. The installation must comply with regulations of the serving gas supplier, local building, heating, plumbing, and other codes. In absence of local codes, the installation must comply with the national codes listed below and all authorities having jurisdiction. In the United States and Canada, follow all codes and standards for the following:

TOPIC	USA	CANADA
Safety	National Fuel Gas Code (NFGC) NFPA 54-2009/ANSI Z223.1 and the Installation Standards, Warm Air Heating and Air Conditioning Systems ANSI/NFPA 90B	National Standard of Canada, Natural Gas and Propane Installation Code (NSCNGPIC) CAN/CSA B149.1
General installation	NFGC and the NFPA 90B. For copies, contact the National Fire Protection Association Inc., Battery march Park, Quincy, MA 02269; or for only the NFGC contact the American Gas Association, 400 N. Capitol, N.W., Washington DC 20001	NSCNGPIC. For a copy, contact Standard Sales, CSA International, 178 Rexdale Boulevard, Etobicoke (Toronto), Ontario, M9W 1R3, Canada
Combustion and air ventilation	Section 9.3 of the NFPA54/ANSI Z223.1 Air for Combustion and Ventilation	Part 8 of the CAN/CSA B149.1, Venting Systems and Air Supply for Appliances
Duct systems	Air Conditioning Contractors Association (ACCA) (Manual D), Sheet Metal and Air Conditioning Contractors National Association (SMACNA), or American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE).	
Acoustical lining and fibrous glass duct	current edition of SMACNA, NFPA 90B as tested by UL Standard 181 for Class I Rigid Air Ducts.	
Gas piping and pipe pressure testing	NFPA 54/ANSI Z223.1 NFGC; Chapters 5, 6, 7, and 8 and national plumbing codes.	CAN/CSA-B149.1, Part 6
Manufactured Mobile housing	Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280 or The Standard for Manufactured Home Installations ANSI/NCS A225.1	Canadian Standard for Series M92 Mobile Homes, CAN/CSA Z240MH
Electrical connections	National Electrical Code (NEC) ANSI/NFPA 70	Canadian Electrical Code CSA C22.1
Venting	Part 7, Venting of equipment, latest edition of the National Fuel Gas Code NPFA 54, 90A and 90B ANSI Z223.1-	CAN/CSA-B149.1-05 latest edition

IN THE STATE OF MASSACHUSETTS:

- This product must be installed by a licensed plumber of gas fitter;
- When flexible connectors are used, the maximum length shall not exceed 36 in. (914 mm);
- When lever type gas shutoffs are used they shall be "T" handle type;
- The use of copper tubing for gas piping is not approved by the state of Massachusetts;

2.2 ELECTROSTATIC DISCHARGE

CAUTION

FURNACE RELIABILITY HAZARD

Failure to follow this caution may result in unit component damage. Electrostatic discharge can affect electronic components. Take precautions during furnace installation and servicing to protect the furnace electronic control. These precautions will help to avoid exposing the control to electrostatic discharge by putting the furnace, the controls, and the technician at the same electrostatic potential.

1. Disconnect all power to the furnace. Multiple disconnects may be required. DO NOT TOUCH THE CONTROL OR ANY WIRE CONNECTED TO THE CONTROL PRIOR TO DISCHARGING YOUR BODY'S ELECTROSTATIC CHARGE TO GROUND.
2. Firmly touch the clean, unpainted, metal surface of the furnace chassis which is close to the control. Tools held in a person's hand during grounding will be satisfactorily discharged.
3. After touching the chassis, you may proceed to service the control or connecting wires as long as you do nothing to recharge your body with static electricity (for example; DO NOT move or shuffle your feet, do not touch ungrounded objects, etc.).
4. If you touch ungrounded objects (and recharge your body with static electricity), firmly touch a clean, unpainted metal surface of the furnace again before touching control or wires.
5. Use this procedure for installed and uninstalled (ungrounded) furnaces.
6. Before removing a new control from its container, discharge your body's electrostatic charge to ground to protect the control from damage. If the control is to be installed in a furnace, follow items 1 through 4 before bringing the control or yourself in contact with the furnace. Put down all used and new controls before touching ungrounded objects.
7. An ESD service kit (available from commercial sources) may also be used to prevent ESD damage.

2.3 LOCATION

This furnace must :

- Be installed so the electrical components are protected from water;
- Not be installed directly on any combustible material other than wood flooring;
- Be located close to the chimney or vent and attached to an air distribution system. Refer to section 7

Place the unit so that proper venting can be achieved, with a minimum number of elbows, in accordance with the instructions in this manual. The furnace should be located as close to the chimney (vertical venting) or to the outside vent wall (horizontal venting) as possible.

When installing the furnace, provisions must be made to ensure the supply of adequate combustion and ventilation air in

accordance with the "air for combustion and ventilation" section of the National Fuel Gas Code, NFPA 5/ANSI Z223. c1 or applicable provisions of the local building code.

2.3.1 Clearance and accessibility

Installations must provide ample space for servicing and cleaning. Always comply with minimum fire protection clearances shown in table 2 or on the furnace rating label. Clearances must also accommodate an installation's gas, electrical, drain trap and venting/combustion air piping. If the combustion air is installed to the side of the furnace, additional clearance must be provided.

2.3.2 Location relative to cooling equipment

The cooling coil can either be installed in the supply air duct or in the return air duct. If the coil is installed in the supply air duct, it must be at a minimum of 6" over the furnace's primary heat exchanger. This will avoid potential error codes due to heated refrigerant when the gas furnace is on. It also allows for a more laminar airflow through the coil. The cooling coil base can be purchased through your local distributor. See table 26 for the appropriate item number.

Table 2: Minimum clearance

Position	Clearance in (mm)
Rear	0
Front ¹	24 (610)
All sides of supply plenum ²	1 (25)
Sides ³	0
Vent	0
Top of furnace	1 (25)

1- For servicing or cleaning, a 24" front clearance is required.

2- For at least the first 3 ft of plenum from furnace

3-Unit connections (electrical, drain trap and combustion air) may necessitate greater clearances than the minimum clearances listed above.

3 INSTALLATION

To ensure proper drainage of the condensate when installed in position other than upflow, the furnace **MUST** be tilted. Refer to figures corresponding to the position of the furnace in the following sections.

! CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in water spillage and/or property damage.

For any position other than upflow, the multiposition pressure switch must be connected pneumatically to the condensate box and electrically to the control to allow the furnace to stop in the event of drain blockage.

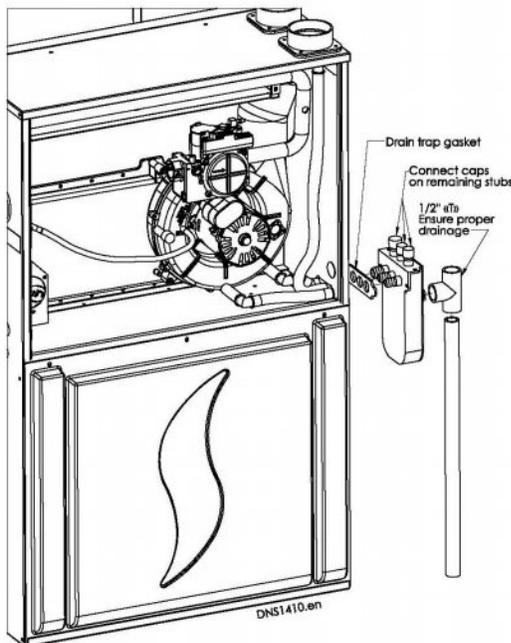
3.1 UPFLOW

The furnace is factory built for upflow position. In this position, the drain trap can be installed on the right or left side depending on air return duct. When installing the furnace in the upflow position, make sure it is leveled or tilted forward.

In the upflow orientation, the drain trap can be installed to the right or to the left of the furnace. The location of the drain trap is dependent of the return duct connection. The furnace must be perfectly leveled or slightly leaned forward to help drain condensate.

3.1.1 Right side condensate drain trap connection

Figure 1: Right side connection



See figure 1 and read the following instructions:

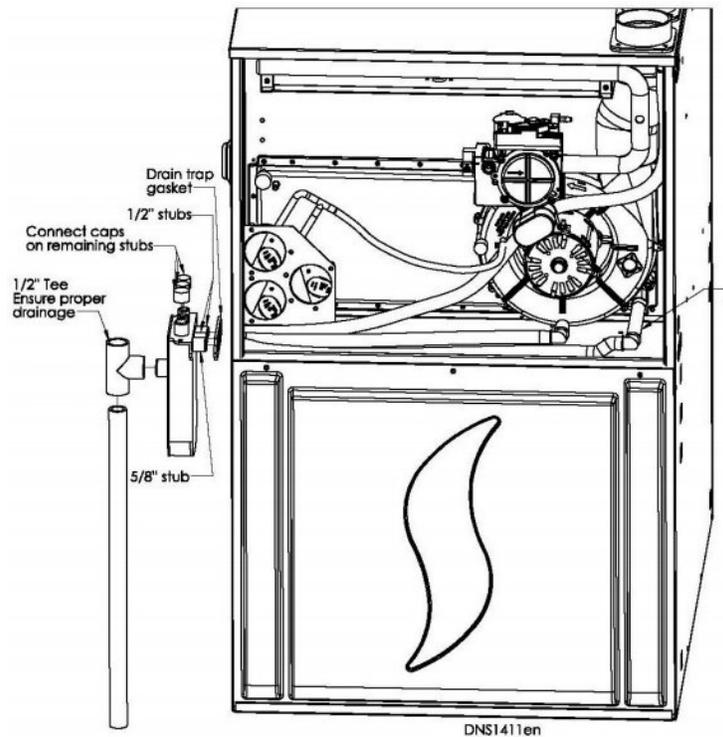
1. Remove the oblong knock-out from the right side of the casing.

2. Place the drain trap gasket on drain trap.
3. Install the drain trap on the right side. See figure 1.
4. Screw in place the drain trap with two head tapping screws on the right side of the furnace.
5. Connect the three stubs to the condensate tubings already in place in the furnace.
6. Connect the outlet drain from the drain trap to an additional condensate tubing using a 1/2" tee for an adequate drainage of the condensate. **DO NOT** vent using the remaining 3 outlet stubs.
7. Prime the drain trap with water. This will ensure proper furnace drainage at startup and will avoid any recirculation of flue gas.
8. On the remaining 3 outlet stub, connect caps (1x5/8" and 2x1/2"). Those caps are furnished in the parts bag.
9. If a condensate pump needs to be use, make sure it is suited for acidic condensate.

3.1.2 Left side condensate drain trap connection

See figure 2 and read the following instructions:

Figure 2: Left side connection



1. Remove the oblong knock-out from the left side of the casing.
2. Place the drain trap gasket on the drain trap.
3. Install the drain trap on the left side, the three outlet stub of the drain trap toward the interior of the furnace.
4. Connect each condensate tubing to a stub. Use the furnished 1/2" and 5/8" tubing to cut the appropriate length to reach the drain trap. The condensate tubing from the condensate box is 5/8" and it must be connected to the 5/8" stub of the drain trap. The condensate tubing from the ID blower and the vent flange are 1/2" and are connected to the 1/2" stubs of the drain trap.

5. Ensure the tubings are adequately connected to the stubs and are correctly sloped to the drain trap. Left side connection requires special attention to the slope of condensate tubing through the furnace.
6. Screw the drain trap in place with two head tapping screws on the furnace side.
7. Connect the outlet drain from the drain trap to an additional condensate tubing using a 1/2" tee for an adequate drainage of the condensate. DO NOT vent using the remaining three outlet stubs. If a condensate pump is used, make sure it is approved for acidic condensate.
8. Prime the drain trap with water. This will ensure proper furnace drainage at startup and will avoid any recirculation of flue gas.
9. On the remaining 3 outlet stub, connect caps (1x5/8" and 2x1/2"). These caps are provided in the parts bag.

3.2 DOWNFLOW

SEE FIGURE 3 FOR INSTALLATION DETAILS



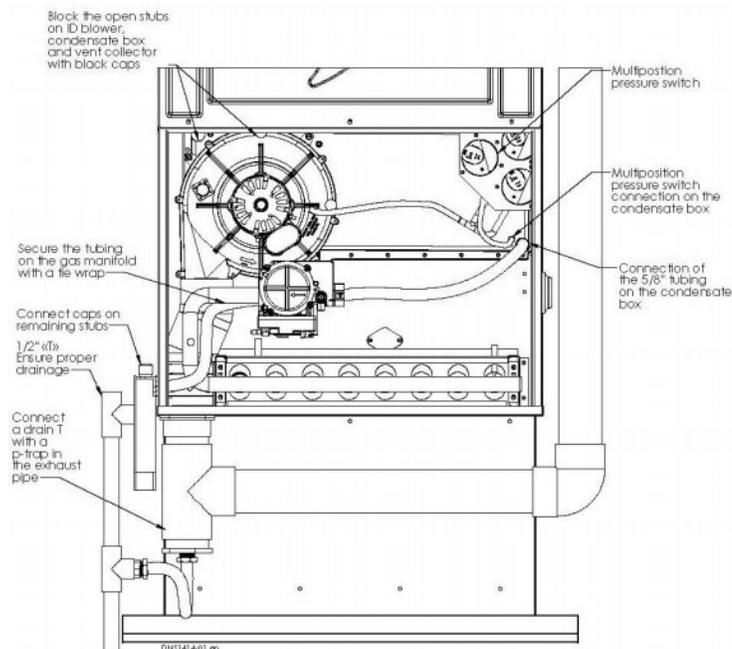
CAUTION

It is STRONGLY RECOMMENDED to use the optional downflow base to ensure the 1" clearance around the supply duct going through the floor and the proper slope of the furnace for condensate drainage. Also, the base allows sufficient spacing for the venting and the drain trap.

When installing the furnace in downflow position, make sure the furnace is tilted forward to make it drain properly.

Plan your installation to have at least 1.0 ft. of clearance under the installed furnace to put the exhaust pipe drainage and drain trap.

Figure 3: Downflow position



3.2.1 Downflow condensate drain trap connection

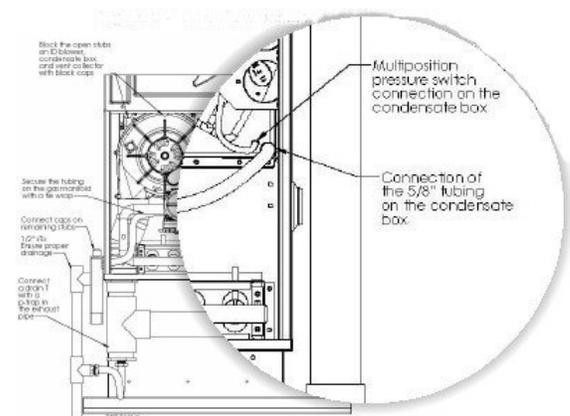
1. Remove all condensate tubing from the inducer blower, condensate box and vent collector. Block the openings with the provided 5/8" and 1/2" black caps. In the downflow position, the only connection to the drain trap comes from the condensate box. The inducer blower will be drained through the exhaust pipe.
2. Remove the downflow drain trap knock-out.
3. Place the drain trap gasket on the drain trap.
4. Install the drain trap.
5. Screw the drain trap in place with two head tapping screws on the side of the furnace.
6. Install two 1/2" black plastic caps on the unused 1/2" inlets of the drain trap inside the furnace.
7. Cut the required length of 5/8" tubing and connect one end on the downflow port of the condensate box. See figure 3 for port location.
8. Connect the other end to the 5/8" inlet of the drain trap and secure the tubing on the gas manifold with a tie wrap.
9. Connect the outlet of the drain trap to the condensate drain piping with a tee. DO NOT vent using the remaining 3 inlet of the drain trap. If a condensate pump is used, make sure it is approved for acidic condensate.
10. Make sure the 5 unused inlets of the drain trap are plugged with provided plastic caps.

3.2.2 Downflow multiposition pressure switch connection

The 3/16" stub just beside the drain of the condensate box must be drilled or cut open. Use the supplied black squared PVC tubing to connect the pressure switch (-0.2 in. w.c.) to this stub.

The pressure switch must also be electrically connected in series with the low fire pressure switch (top) using the brown jumper provided in the parts bag.

Figure 4: Connecting pressure switch in downflow position



3.3 HORIZONTAL RIGHT

Figure 5: Horizontal right position

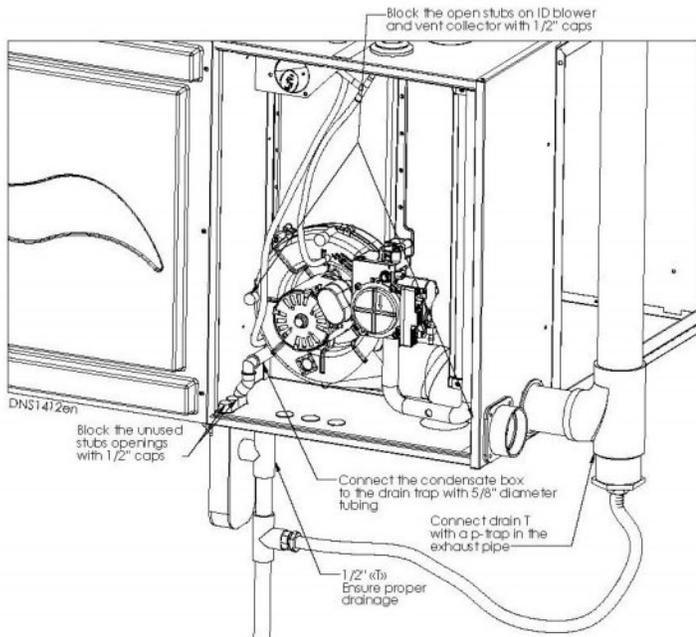
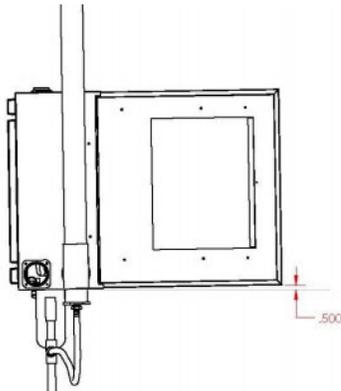


Figure 6: Horizontal right slope



When installing the furnace in horizontal right position, make sure the furnace is tilted forward to make it drain properly. Refer to figure 6.

Plan your installation and make sure you have sufficient space for the drain trap and exhaust pipe drainage. Drain trap will add approximately 6.50" to the furnace width. Refer to figure 5.

3.3.1 Horizontal right condensate drain trap connection

REFER TO FIGURE 5 FOR INSTALLATION DETAILS

1. Remove all condensate tubings from the inducer blower and vent collector. Block the openings with provided 5/8" and 1/2" black caps.
2. Remove the horizontal right drain trap knock-out.
3. Place the gasket on the drain trap.
4. Screw the drain trap in place with 2 self-tapping screws to the side of the furnace.

5. Install two 1/2" black caps on the unused inlets of the drain trap inside the furnace.
6. Connect a small length of 5/8" condensate tubing to the condensate box and route with an elbow to the drain trap. Make sure it can drain properly.
7. Connect the outlet of the drain trap to the condensate drain piping with a tee. DO NOT vent using the remaining 3 inlets. If a condensate pump is used, make sure it is approved for acidic condensate.
8. Prime the drain trap with water. This will ensure proper furnace drainage at startup and will avoid any recirculation of flue gas.
9. On the remaining 5 inlets, connect black caps (1x5/8" and 2x1/2"). These caps are provided in the parts bag.

3.3.2 Horizontal right multiposition pressure switch connection

Figure 7: Horizontal right pressure switch connection

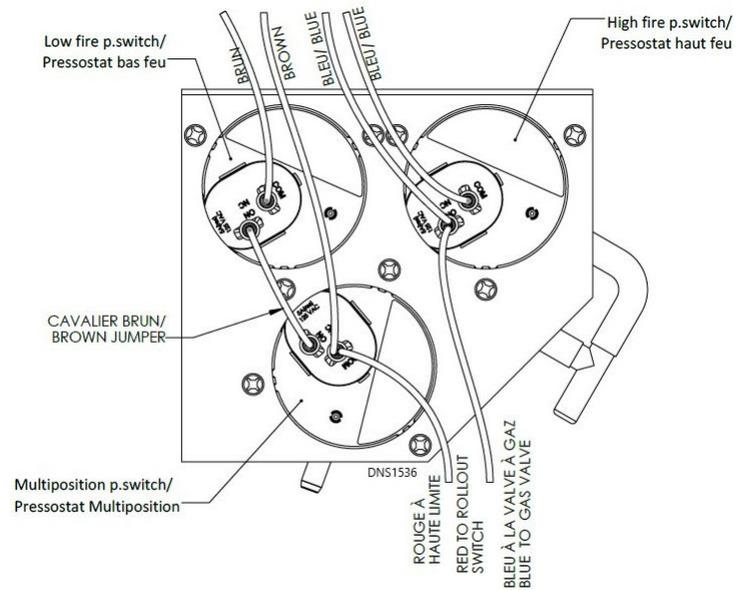
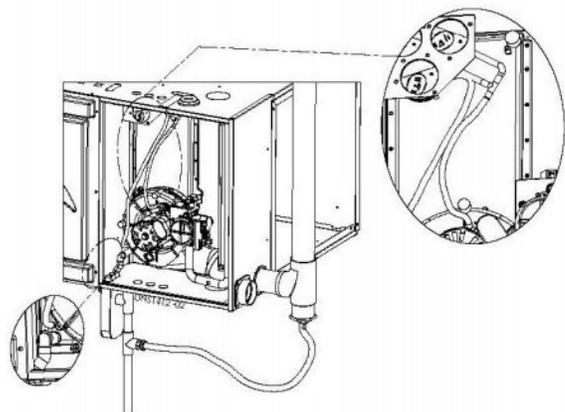


Figure 8: Horizontal right pressure switch tubing

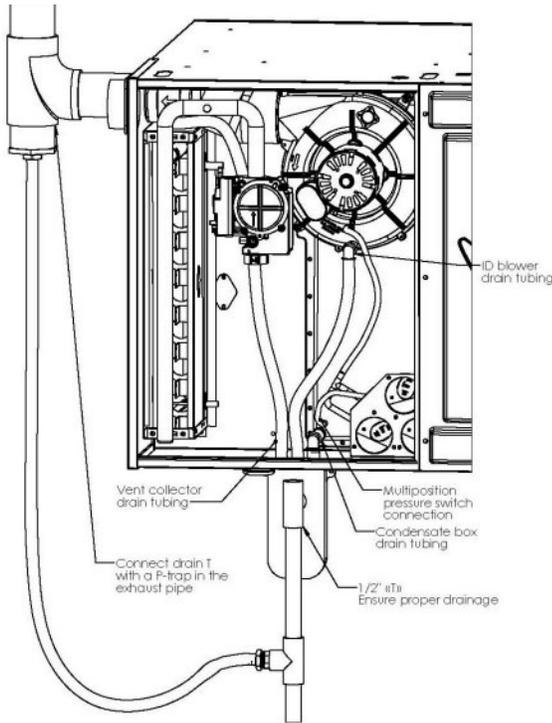


The 3/16" stub just beside the drain of the condensate box must be drilled or cut open. The black squared PVC tubing must

connect the pressure switch (-0.2 in w.c.) to this stub. This tubing is provided with the furnace. Refer to figure 5 to see which port is associated to the horizontal right position. The pressure switch must also be electrically connected in series with the low fire pressure switch (top) using the brown jumper provided in the parts bag. Refer to figure 7 (Horizontal right pressure switch connection) for more details.

3.4 HORIZONTAL LEFT

Figure 9: Horizontal left position



8. Reroute the vent collector drain tube to one of the 1/2" stubs of the drain trap. Cut the provided 1/2" tubing at the appropriate length to reach the drain trap.

9. Connect the outlet from the drain trap to the condensate drain piping using a 1/2" PVC tee. If a condensate pump is used, make sure it is approved for acidic condensate.

10. Prime the drain trap with water. This will ensure proper furnace drainage at startup and will avoid any recirculation of flue gas.

11. On the remaining 3 outlet stub, connect caps (1x5/8" and 2x1/2"). These caps are provided in the parts bag.

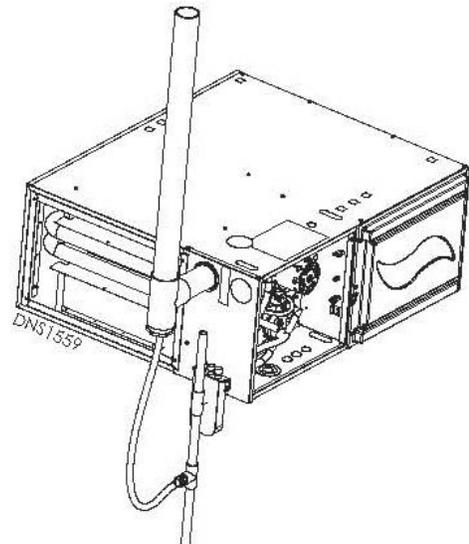
3.4.1 Horizontal left condensate drain trap connection

REFER TO FIGURE 9 FOR INSTALLATION DETAILS.

1. Remove all tubing from the ID blower, condensate box and vent collector and block the stub openings with furnished 5/8" and 1/2" black caps.
2. Remove the oblong knock-out from the bottom middle side of the casing. (An alternate knock-out is available on the furnace top panel if space is constrained)
3. Place gasket on the drain trap.
4. Screw in place the drain trap with 2 self-tapping screws to the side of the furnace. The drain trap must be vertical.
5. Drill open the new bottom stub of the ID blower (if not already open). Be sure to remove all debris.
6. Reroute the ID blower drain tube from the bottom of the ID blower casing to one of the 1/2" stub of the drain trap. Cut the provided 1/2" tubing at the appropriate length to reach the drain trap.
7. Reroute the condensate box drain tubing from the bottom of the condensate box to the 5/8" stub of the drain trap. Cut the provided 5/8" tubing at appropriate length to reach the drain trap.

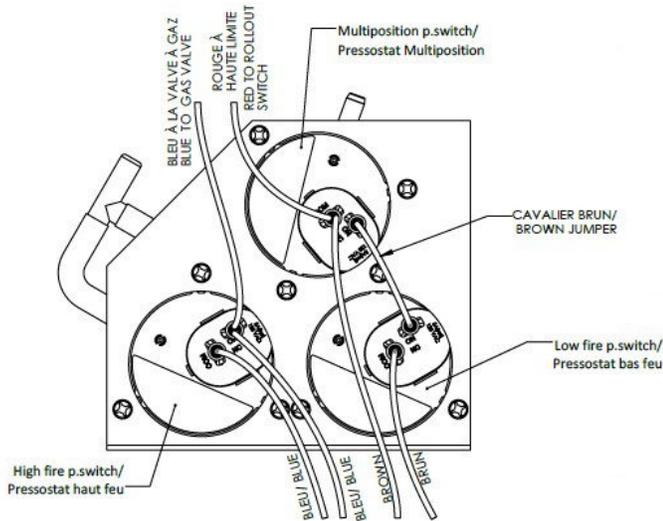
3.4.2 Alternate drain trap location in horizontal left position

Figure 10: Drain trap alternate position



3.4.3 Horizontal left multiposition pressure switch connection

Figure 11: Horizontal left pressure switch connection



Position horizontale gauche
Horizontal left position

The 3/16" stub just beside the drain of the condensate box must be drilled or cut open. Use the supplied black squared PVC tubing to connect the pressure switch (-0.2 in. w.c.) to this stub. (see figure 9)

The pressure switch must also be electrically connected in series with the low fire pressure switch (top) using the brown jumper furnished in the parts bag. Refer to figure 11 for more details.

3.5 MULTIPOSITION VENTING DRAINAGE

All furnaces with horizontal exhaust vent piping must have drain tee assembly and trap installed in the exhaust pipe as close to the furnace as possible. See Figures 3, 5 and 9.

4 DUCT INSTALLATION

4.1 GENERAL REQUIREMENTS

The duct system should be designed and sized according to accepted national standards such as those published by: Air Conditioning Contractors Association (ACCA), Sheet Metal and Air Conditioning Contractors National Association (SMACNA) or American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE). Consult The Air Systems Design Guidelines reference tables available at your local distributor.

The duct system should be sized to handle the required system design airflow at the design external static pressure. The furnace airflow rates are provided in section 8.2 of this manual. When a furnace is installed so that the supply ducts carry air

circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by duct(s) sealed to the furnace casing and terminating outside the space containing the furnace. This furnace may be installed, with a two pipe sealed combustion configuration (direct vent), in a space utilized as part of the return air supply. A filter must be installed in the return opening of the furnace and a grill should be installed in the space to allow proper circulation of air.

Secure ductwork with proper fasteners for type of ductwork used. Seal supply and return duct connections to the furnace with code approved tape or duct sealer.

Ductwork passing through an unconditioned space should be insulated to enhance system performance. When air conditioning is used, a vapour barrier is recommended.

Maintain a 1 in. (25 mm) clearance from combustible materials to supply air ductwork for a distance of 36 in. (914 mm) horizontally from the furnace. See NFPA 90B or local code for further requirements.

Flexible connections can be used between ductwork and furnace to prevent transmission of vibration.

Many states, provinces and localities are considering or have implemented standards and/or restrictions on duct sizing practices, ductwork leakage, and/or ductwork thermal, airflow and electrical efficiencies. CONSULT LOCAL CODE OFFICIALS for ductwork design and performance requirement in your area.

4.2 DUCT EXTERNAL STATIC PRESSURE

Higher than prescribed static pressure will decrease the air flow, causing excessive temperature rise, opening of the thermodisk, failure of the heat exchanger and / or poor performance of the heat pump / air conditioning.

To measure total external static pressure, proceed as follow:

1. Run the furnace at the system maximum airflow
2. Return duct : Make sure the furnace filter is clean and measure the static pressure between the filter and the inlet of the furnace (negative pressure reading)
3. Supply duct : Measure the static pressure between the furnace and the cooling coil (positive static pressure). Tape up the hole when test is complete.
4. Subtract the inlet pressure from the supply pressure. For exemple, if you measured 0.3"w.c. in the supply and -0.2" in the return:
 $0.3\text{w.c.} - (-0.2\text{w.c.}) = 0.5\text{w.c.}$

If the total external static pressure exceeds the maximum listed on the furnace rating plate, check for closed dampers, register, improperly size duct work or incorrect dipswitch settings. Make sure the temperature rise is coherent with the furnace rating plate.

4.3 RETURN AIR CONNECTIONS

The return air duct must be connected to the bottom, left side or right side. If necessary (depending on your filter restriction), provision should be made for a double return.

In downflow configuration, side return air is not permitted, it must be connected to bottom.

Connection to the back of the furnace is prohibited.

Static pressure in the return air duct should be -0.2"w.c. at system maximum airflow.

To avoid high noise level from the return side of the unit, return duct shall have at least two 90° elbows and 10 ft of straight duct.

4.3.1 Bottom return

Cut a rectangular opening on the bottom plate of the furnace using the knock-outs.

In Upflow orientation when using the bottom inlet, return air base can be used. This base allows the connection of the duct on the side with a bottom inlet.

4.3.2 Side return

Remove 4 knock-outs on the side of the furnace of the 8 knock-outs available. Use table 3 for suggested return size. Install the return air inlet as per local codes.

Table 3: Suggested Filter size

Model	Filter size
15kBTU	16.00 x 20.00"
30kBTU	16.00 x 20.00"
45kBTU	16.00 x 20.00"
60kBTU	16.00 x 25.00"
75 kBTU	16.00 x 25.00"
105 kBTU	16.00 x 25.00"
120 kBTU	16.00 x 25.00"

4.4 SUPPLY AIR DUCTS

The supply air duct must be connected to the furnace supply outlet air duct flanges. DO NOT cut furnace casing to attach supply air duct, humidifier, or other accessories. All accessories must be connected to the supply or return ductwork, external to furnace's casing. It is recommend that the outlet duct be provided with a removable access panel. This opening shall be accessible when the furnace is installed and shall be sized to allow the heat exchanger to be viewed or a probe to be inserted for sampling the air stream. The cover attachment should prevent leaks.

4.4.1 Ductwork acoutiscal treatment

Metal duct systems that do not have a 90 degree elbow and 10 ft. (3 M) of main duct to the first branch take-off may require internal acoustical lining. As an alternative, fibrous ductwork may be used if constructed and installed in accordance with the latest edition of SMACNA construction standard on fibrous glass ducts. Both acoustical lining and fibrous ductwork shall comply with NFPA 90B as tested by UL Standard 181 for Class

1 Rigid air ducts.

5 GAS SUPPLY AND PIPING

5.1 GENERAL

WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death or property damage. Never test for gas leaks with an open flame. A fire or explosion may result causing property damage, personal injury or loss of life. Use a commercially available soap solution made specifically for the detection of leaks to check all connections.

Installations must be made in accordance with all authorities having jurisdiction.

Use a back-up wrench on the inlet of the gas valve when connecting the gas line to the gas valve.

Refer to Table 6 for recommended gas pipe sizing. Support all gas piping with appropriate straps and hangers. Use a minimum of 1 hanger every 6 ft (1.8 m). Joint compound (pipe dope) should be applied sparingly and only to male threads of joints. Pipe dope must be resistant to the action of propane gas.

An accessible manual shut off valve MUST be installed external to furnace casing.

Install a sediment trap in riser leading to the furnace as shown in Figure 14. Connect a capped nipple into lower end of the tee. The capped nipple should extend below level of furnace gas controls.

Install a union between the manual shut off gas and the gas valve in order to remove it easily.

Leak test the unit and gas connections.

The gas supply pressure shall be within the maximum and minimum inlet supply pressures marked on the rating plate and in Table 4.

The furnace gas valve inlet pressure tap connection is suitable to use as a test gauge port providing test pressure.

5.2 PROPANE CONVERSION

To convert from natural to L.P. gas, installer should use the appropriate conversion kit. Please refer table 26.

Make sure the inlet gas pressure is as indicated in table 4. The conversion kit consist of orifices, spring and stickers to clearly identify conversion on the gas valve.

Follow the steps bellow to convert the gas valve to propane :

1. Change the orifice of the manifold, they are provided in the conversion kit and their size is #56.
2. Remove both regulator cover screws.
3. Remove both regulator adjustment screws (beneath the cover screws).

4. Remove both Natural Gas regulator springs from regulator sleeves.
5. Insert the L.P. regulator springs (provided in the conversion kit) into the regulator sleeves.
6. Place the High regulator adjustment screw and adjust approximately 4 turns to the bottom stop.
7. Place the Low regulator adjustment screw and adjust approximately 6 turns to the bottom stop.
8. Start the furnace and adjust both outlet pressures (8.6" w.c on 2nd stage and 5.0" w.c. on the first stage). Clockwise to increase pressure and counter clockwise to decrease pressure.
9. Place both regulator cover screws.
10. Attach the WARNING label (provided in the kit) to the gas valve where it can be readily seen. Also attach the small round L.P. labels to the top of the regulator cover screws.
11. Conversion back to Natural Gas use may be done at a later date by retaining the Natural Gas springs and orifice (removed in steps above) and following the same procedure (except for burner pressures)

5.3 GAS PIPE GROMMET

For direct vent applications, the hole for the gas pipe on the cabinet must be sealed to prevent air leakage. Make sure the grommet is in place, then insert the gas pipe.

5.4 SETTING GAS OUTLET PRESSURE

To ensure the furnace operates to the correct input refer to the rating plate or to table 5, follow these steps to properly adjust the outlet gas pressure:

1. Turn off all electrical power to the system.
2. Take the outlet pressure test screw out one turn counterclockwise. (See outlet pressure boss on figure 12.)
3. Attach a hose and a manometer to the outlet pressure boss of the valve.
4. Turn on the system power and make a call for first stage heat on the thermostat.
5. Remove both regulator cover screws and adjust the low fire regulator (see figures 12 and 13). Adjust the screw clockwise to increase pressure or counterclockwise to decrease pressure. Always adjust the regulator to provide the correct pressure, as mentioned on the rating plate and table 5.
6. Make a call for second stage heat on the thermostat.
7. Turn the high fire regulator adjust screw (see figure 12) clockwise to increase pressure or counterclockwise to decrease pressure. Always adjust the regulator to provide the correct pressure, as mentioned on the rating plate and table 5.
8. Replace regulator cover screws and tighten securely.
9. Turn off all electrical power to the system.
10. Remove the manometer hose from the outlet pressure boss.
11. Turn outlet pressure test screw to seal the pressure port (clockwise, 7in-lb minimum)

12. Turn on the electrical power to the system.
13. Make a call for heat on the thermostat.
14. Using a leak detection solution or soap suds, check for leaks at the pressure boss screw. If a leak is detected, SHUT OFF GAS AND FIX ALL LEAKS IMMEDIATELY.

Figure 12: Two stage gas valve

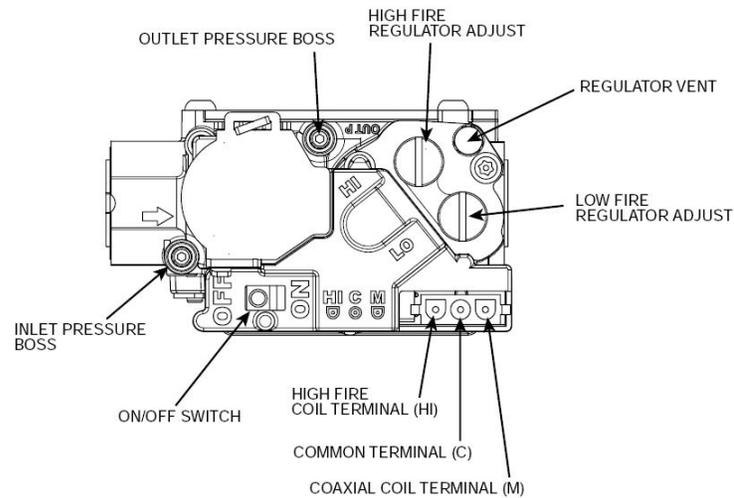


Figure 13: Adjustment screw

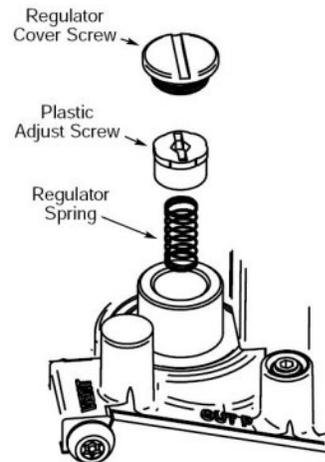


Figure 14: Typical gas pipe arrangement

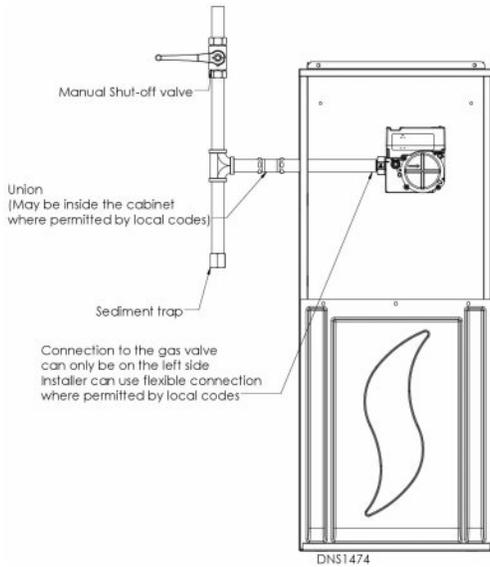


Table 4: Inlet Gas Pressure

	Gas Pressure in.w.c. (psig)	
	Minimum	Maximum
Natural Gas	4.5	10.5
Propane	11.0	13.0

Table 5: Outlet gas pressure

Input	Gas Pressure in. w.c.	
	Natural Gas	Propane
High fire (100%)	3.0	8.6
Low fire (70%)	1.55	5.0

Table 6: Maximum capacity of pipe Ft³/hr for pipe length ft (m)

Nominal Iron pipe size in. (mm)	Internal dia. in. (mm)	10 (3.0)	20 (6.0)	30 (9.1)	40 (12.1)	50 (15.2)
1/2 (13)	0.622 (15.8)	175	120	97	82	73
3/4 (19)	0.824 (20.9)	360	250	200	170	151
1 (25)	1.049 (26.6)	680	465	375	320	285
1-1/4 (32)	1.380 (35.0)	1400	950	770	660	580
1-1/2 (39)	1.610 (40.9)	2100	1460	1180	990	900

CFH = Furnace input (BTH/hr)/Heating value of gas (BTU/ft³)

6 ELECTRICAL CONNECTIONS

6.1 120V WIRING

The furnace must have a 120 V power supply properly connected and grounded.

NOTE: Proper polarity must be maintained for 120 V wiring. If polarity is incorrect, the control LED status indicator light will indicate an error code and the furnace will not operate.

Verify that the voltage, frequency, and phase correspond to the specifications on the rating plate of the unit. Assert that the service provided by utility is sufficient to handle load imposed by this equipment. Refer to Table 23 for equipment electrical specifications.

Use a separate, fused branch electrical circuit with a properly sized fuse or circuit breaker for this furnace. See Table 23 for fuse specifications. A readily accessible means of electrical disconnect must be located within sight of the furnace.

6.2 24V THERMOSTAT WIRING

Make field 24 V connections at the 24 V terminal strip. Connect terminal Y/Y2 for proper cooling operation. Use AWG No. 18,

color-coded, copper thermostat wire. For wire lengths over 100 ft., use AWG No 16 wire.

6.3 FUSE

The 24 V circuit contains an automotive type, 3-amp fuse located on the control (R99G016). Any direct shorts during installation, service, or maintenance could cause this fuse to blow. Replace only with a fuse of the same ratings.

6.4 THERMOSTATS

A single-stage or two-stage thermostat may be used with the furnace. Consult the thermostat installation instructions for specific information about configuring the thermostat.

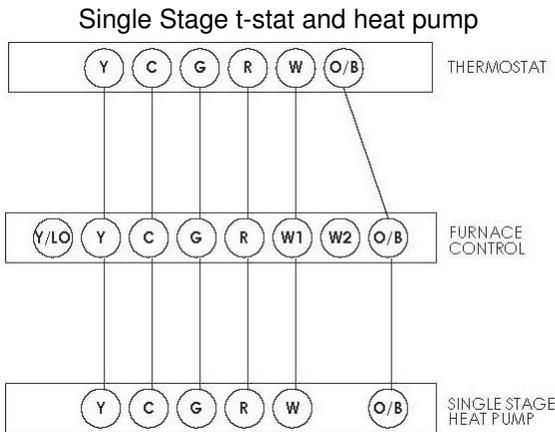
6.4.1 Single-Stage thermostat

Use the DIP switches S7-1 and S7-2 (see table 7) to configure for a single-stage thermostat. Options include a 10-minute delay on second stage, 20-minute delay on second stage or an auto setting allowing the module to calculate the time delay for second stage based on average demand (between 1 and 12 minutes).

Table 7: Single stage t-stat with 2 stage ECM furnace

S7-1	S7-2	TIME
OFF	OFF	N/A
ON	OFF	10 MIN
OFF	ON	AUTO
ON	ON	20 MIN

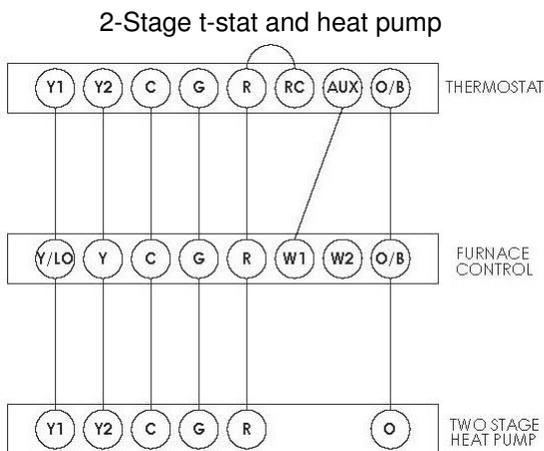
Figure 15



6.4.2 Multi-Stage thermostat

The control is set from the factory to be used with a multi-stage thermostat. This configuration allows 2-Stage A/C, 2-Stage Heat pump as well as 2-Stage gas heating (when configuring dipswitches S7-1 and S7-2).

Figure 16



6.5 ELECTRIC DIAGRAM

The wiring diagram is shown on figure 32.

6.6 ALTERNATE POWER SUPPLY

Operating the furnace on a generator or other alternate power supply is not recommended. If so it must produce a smooth sinusoidal waveform for compatibility with the furnace electronics. The alternate power supply must generate the same voltage, phase, and frequency (Hz) as shown on the furnace rating plate.

Power from an alternate power supply that is non-sinusoidal may damage the furnace electronics or cause erratic operation. Contact the alternate power supply manufacturer for

specifications and details.

7 VENTING AND COMBUSTION AIR PIPING

! WARNING

CARBON-MONOXIDE POISONING HAZARD

Failure to follow instructions could result in severe personal injury or death due to carbon-monoxide poisoning, if combustion products infiltrate into the building.

Check that all openings in the outside wall around the vent (and air intake) pipe(s) are sealed to prevent infiltration of combustion products into the building.

Check that furnace vent (and air intake) terminals are not obstructed in any way, regardless of outdoor conditions.

! WARNING

Corrosive or contaminated air may cause failure of parts containing flue gas, which could leak into the living space. Air for combustion must not be contaminated by halogen compounds, which include fluoride, chloride, bromide and iodide. These elements can corrode the heat exchanger and burner cabinet component. This conditions would shorten the furnace life. Air contaminants are found in aerosol sprays, detergents, bleaches, cleaning solvents, salts, air fresheners, and other household products. Do not install the furnace in a corrosive or contaminated atmosphere. Make sure all combustion and circulating air requirements are met, in addition to all local codes and ordinances.

7.1 GENERAL

These furnaces are certified as either direct vent (two pipe) or non-direct vent (single pipe).

If this furnace replaces a furnace that was connected to a vent system or chimney, the vent may need to be re-sized.

An abandoned masonry chimney may be used as a raceway for properly insulated and supported combustion air (when applicable) and vent pipes. If more than one furnace is installed, they must have their own set of combustion air and vent pipes and be terminated individually. Other gas appliances with their own venting system may also use the abandoned chimney as a raceway providing it is permitted by local code, the current edition of the National Fuel Gas Code and the vent or liner manufacturer's installation instructions. Care must be taken to prevent the exhaust gases of one appliance from contaminating the combustion air of other gas appliances. Do not take combustion air from inside the chimney when using ventilated combustion air or single pipe vent option.

For Canadian Installations, field supplied PVC venting materials must be UL S636 listed. This requirement does not apply to the combustion air pipe.

Below are important information that needs to be considered when installing the venting system:

- The vent pipe and combustion air pipe must of be the same diameter.
- Slope horizontal vent piping upward a minimum of 1/4" per foot of run so that condensate drains toward the furnace.
- Support horizontal vent piping at least every five feet. No sags or dips are permitted.
- The vent pipe and combustion air pipe must terminate on the same building side.
- Provide the space with sufficient air for proper combustion using permanent pipe (direct-vent) or opening(s) directly communicating with the outdoors (non directe vent).
- Insulate all vent runs through unconditioned spaces where below-freezing temperatures are expected with 1" thick medium-density, foil-faced fiberglass. (In Canada, per the vent manufacturer's instructions)
- For runs where condensate could accumulate and freeze (including vent termination), wrap the vent pipe with self-regulating 5 Watt heat tape. The heat tape must be U.L./CSA. listed and installed per the manufacturer's instructions.
- The combustion air and exhaust terminations must be at least 12" above grade/expected level of snow.
- Ensure the location of the combustion air inlet with respect to the exhaust vent terminal complies with Figure 29 and local codes.

7.2 VENT/EXHAUST BLOCKAGE DUE TO ICE BUILD UP

! WARNING

If outdoor design conditions are 5°F (-15°C) or colder, there is a significant risk of ice blockage at the vent termination. To mitigate this risk, provision should be made for a heating cable at the exhaust. Additionally, ensure the exhaust termination is easily accessible to allow for manual deicing if the heating cable proves insufficient.

If design outdoor conditions are 5°F (-15°C) or less, this section should be thoroughly considered before final installation of the furnace.

We are proud to offer one of the most efficient furnaces (+97% AFUE) on the market as well as being the only supplier of perfectly sized furnace in terms of footprint and input. The energy supplied to the furnace is delivered throughout the home for the comfort of the occupant rather than outside.

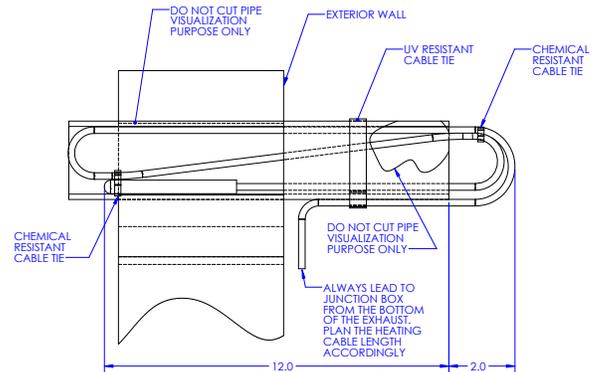
In these installations, residual energy in the chimney/vent are minimized and flue gases are expelled at low velocity. In some weather conditions, it leads to condensate freeze up at the termination and the furnace shuts down because of the ice blockage.

To prevent this phenomenon, we highly suggests installing 5-watt/ft or 7-watt/ft self-regulating heating cable at the termination, inside of the pipe. Heating cable must be UL listed. We recommends installing cable as per figure 17. While the

figure depicts a straight vent termination, the insertion pattern applies to any permitted termination type.

The exhaust termination should be easily accessible in case the heating cable is insufficient, allowing for easy removal of any ice blockage.

Figure 17: Suggested heating cable insertion in vent termination



7.3 DIRECT VENT

When this furnace is installed as a direct vent (2 pipes) furnace, no special provisions for combustion air are required.

Direct vent installations require a dedicated combustion air and exhaust vent piping. The system is only using outside air for combustion.

The vent and combustion air pipe can terminate vertically, through the roof or horizontally through and outside wall. Refer to figures for approved termination.

Penetration through a roof requires appropriate sealing and proper flashing.

In Canada, refer to manufacturer's instructions for supporting ULC S636 venting. ABS can be used for the combustion air pipe.

7.4 NON DIRECT VENT

All air for combustion comes directly to the furnace from a space that is well ventilated with outdoor air (such as an attic or crawlspace). In addition, other gas appliances installed in the space with the furnace may require outside air for combustion. The combustion air pipe cannot be terminated in attics or crawlspaces that uses ventilation fans designed to operate during the heating season. If ventilation fans are present in these areas, the combustion pipe must terminate outdoors as a direct vent (2 pipe) system.

7.5 SPECIAL VENTING REQUIREMENTS FOR INSTALLATION IN CANADA

In Canada, S636 certified primers and cements must be used and be of the same manufacturer of the S636 venting system. Do not mix primers and cements from one manufacturer with a vent system from a different manufacturer. Follow the manufacturer's instructions for the use of primer and cement and never use primer or cement beyond its expiration date.

All fire stop and roof flashing used with this system must be UL listed material.

Acceptability under Canadian standard CAN/CSA B149 requires full compliance with all installation instructions.

The authority having jurisdiction (gas inspection authority, municipal building department, fire department, etc.) should be consulted before installation to determine the need to obtain a permit.

7.6 MATERIAL

USA:

Combustion air and vent pipe, fittings, primers and solvents must conform to American National Standard Institute (ANSI) and American Society for Testing and Material (ASTM) and be of the same manufacturer. See table 8

Table 8: Approved Vent and Combustion air pipe material USA installation

Material	Standards
PVC - DWV	ANSI/ASTM D2265
PVC schedule 40	ANSI/ASTM D1785
CPVC Schedule 40	ANSI/ASTM F441
SDR-21, SDR-26-26 PVC	ANSI/ASTM D2241
ABS-DWV Schedule 40	ANSI/ASTM D2661
Stainless steel (SS)	UL-1738
Polypropylene (PP)	UL-1738 and ULC-S636

All vent piping and combustion air piping MUST conform to local and national codes.

Pipe cement must be PVC (ANSI/ASTM D2564) or CPVC (ANSI/ASTM F493).

Primers must be PVC/CPVC (ANSI/ASTM F656).

CANADA:

Vent pipe installations in Canada must conform to the requirements of CAN/CSA B149 code. PVC and CPVC vent systems must be composed of pipe, fittings, cements, and primers listed to ULC S636 and must be of the same manufacturer.

Combustion air pipe can use ABS material meeting the ASTM standard D2661 / CSA B181.1.

All vent piping and combustion air piping MUST conform to local and national codes.

7.7 SIZE THE VENT AND COMBUSTION AIR PIPES

Furnace combustion air and vent pipe connections are sized for 2" pipe. Any pipe diameter change should be made outside furnace casing in a vertical section of the pipe. Any change in diameter to the pipe must be made as close to the furnace as reasonably possible.

The maximum allowable vent length for the vent and combustion air pipe (when used) is listed in table 9 and depends on the furnace input. The maximum length must include straight pipe and any fitting and termination. Equivalent length of various fitting is list in table 10.

A minimum linear length of 5 ft must be respected.

To properly measure the Equivalent Vent Length :

1. Measure the linear pipe distance from the furnace to the termination for each pipe.
2. Count the number of elbows for each pipe.
3. For each pipe, multiply the number of elbows by the equivalent length for the type of elbow used (see table 10). Record the equivalent length of all the elbows for each pipe.
4. Record the equivalent length of the termination used (see table 10).
5. Add the equivalent length of the elbows and termination to the linear distance measured for each pipe.
6. If the calculated vent length is greater than the maximum allowed vent length (for either vent pipe or combustion air pipe), consider modifying the termination location or use a greater pipe diameter.

Table 9: Maximum equivalent vent length (ft) for 2-stage unit and altitude up to 4500 ft

Unit size	Vent pipe dia.	
	2"	3"
30,000	100	N/A
45,000	70	90
60,000	70	90
75,000	70	90
105,000	15	80
120,000	10	40

Table 10: Deduction for fittings

Type of elbow	Equivalent Length (ft)
45° standard	5
45° long sweep	2.5
90° standard	10
90° long sweep	5
Tee	1.5

7.8 EXHAUST PIPE CONNECTION TO FURNACE

Never common vent with any other appliance. Do not install in the same chase or chimney as 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 approved PVC pipe and the other pipes. Clean and deburr all pipe cuts.

In the included parts bag, an exhaust venting gasket is supplied and needs to be installed on the exhaust of the top panel. (See figure 28)

When 3" pipe is used, connect a 2" to 3" coupling to the 2" pipe.

For proper installation of venting/exhaust pipe:

1. Position the supplied venting gasket on the top panel exhaust.
2. Slowly slide a 2" diameter pipe through the venting gasket. This step will be easier if pipe is chamfered.
3. Position this venting pipe length on the rubber vent collector and tighten the collar.
4. Install the remaining vent pipes. It is recommended that all pipes be cut, prepared, and preassembled before permanently cementing any joint.
5. Working from furnace to outside, cut the pipe to the required length(s).
6. Deburr the inside and outside of the pipe.
7. Chamfer the outside edge of pipe for better distribution of primer and cement.
8. Clean and dry all surfaces to be joined.
9. Check dry fit of the pipe and mark insertion depth on the pipe.
10. After the pipes have been cut and preassembled, apply a generous layer of cement primer to the pipe fitting socket and end of the pipe to insertion mark. Quickly apply approved cement to end of the pipe and fitting socket (over primer). Apply cement in a light, uniform coat on the inside of socket to prevent build-up of excess cement. Apply second coat.
11. While cement is still wet, twist pipe into the socket with 1/4" turn. Be sure the pipe is fully inserted into the fitting socket.
12. Wipe excess cement from the joint. A continuous bead of cement will be visible around perimeter of a properly made joint.
13. Handle pipe joints carefully until cement sets.
14. Horizontal portions of the venting system shall be supported to prevent sagging. Support any piping at a minimum of every 5 ft. using perforated metal hanging strap or commercially available hangars designed to support plastic pipe.
15. Prevent condensate from accumulating in the pipes by sloping the combustion air piping and vent piping downward toward furnace a minimum of 1/4" per linear ft. with no sags between hangers.
16. Complete the vent installation by installing the required termination. See figures 23 to 27 for allowed termination.
17. Use appropriate methods to seal the openings where combustion air pipe and vent pipe pass through roof or sidewall.

7.9 COMBUSTION AIR PIPE CONNECTION

Chinook gas furnaces have three possible locations for the combustion air connection : top panel, right side panel or left side panel. Choose which configuration is best suited for your application. See figures 19 and 20.

To connect the combustion air pipe, use the venting flange with the gasket and screw it to the chosen location. Secure the combustion air pipe to the flange using glue.

At the combustion air termination, use a 90° elbow or two medium-radius sweep elbows to keep the inlet downward and prevent the entry of rain. The inlet opening of the combustion air termination must be a minimum of 12" above the anticipated level of snow accumulation.

The furnace may have a drain tee assembly and trap installed in the combustion air pipe as close to the furnace as possible (see figure 18). This is to drain any water that may enter the combustion air pipe, preventing entry in the furnace vestibule area.

Note that with horizontal combustion air pipe there is a risk of excessive moisture entering the combustion air pipe and consequently, furnace cabinet. A moisture trap should be added to the combustion air pipe as shown in figure 18.

Figure 18: Combustion air moisture trap

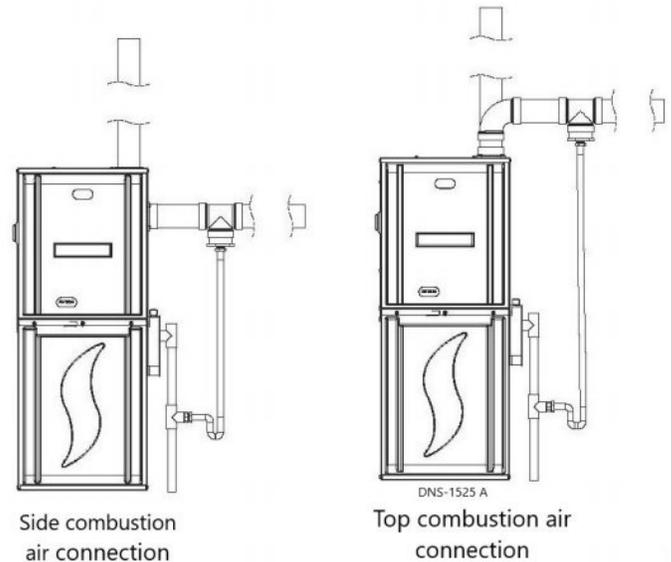


Figure 19: Top panel combustion air

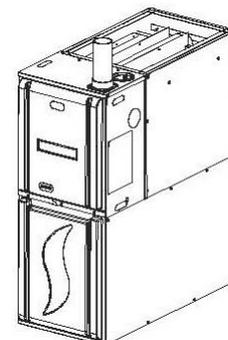


Figure 20: side panel combustion air

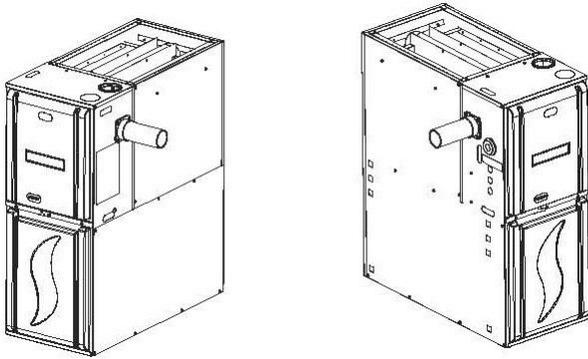


Figure 21: Roof concentric termination

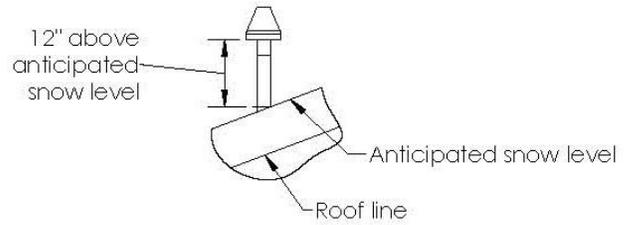
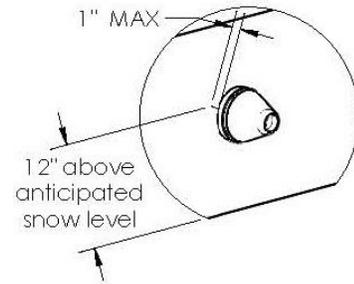


Figure 22: Sidewall concentric termination



7.10 VENT TERMINATION

All clearance specified in this manual are in accordance with the current CSA B149.1, Natural and Propane Installation Code and the current ANSI Z223.1/NFPA 54, National Fuel Gas Code. For clearance not specified in these codes, clearance should be in accordance with local installation codes and the requirements of the gas supplier and the instructions in this manual.

A vent for this appliance shall not terminate:

- over public walkways;
- near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard;
- near regulators, relief valves, or other equipment where condensate or vapor could be detrimental to their operation;

See figures 29 and 30 for venting clearance.

7.10.1 Concentric vent

Concentric vent can cause ice build up at the termination and cause the furnace to shut off. Especially with our furnaces having an input below 30,000 BTU/hr. In these installations, flue gases are not expelled at a velocity to prevent ice formation. If a concentric vent is to be use with these low input, intall a 1.5" diameter pipe within the 2" diameter pipe **in the concentric**. Vent before the concentric shall remain 2" diameter. This will enhance flue gas speed at the end of the pipe and will reduce the risk of ice build up.

For multiple concentric installation, spacing of minimum 12" between each concentric is required. Figures 21 and 22 show the required clearance for concentric installation.

For installation through the roof or side wall, cut one 4" (102 mm) diameter hole for 2" (51 mm) kit, or one 5" (127 mm) diameter hole for 3" (76 mm) kit in the desired location. Loosely assemble concentric vent/combustion air termination components together following the kit instructions. Slide the assembled kit with rain shield **REMOVED** through the hole in the wall or roof flashing.

NOTE: Do not allow insulation or other materials to accumulate inside the pipe assembly when installing it through the hole. Disassemble loose pipe fittings. Clean and cement using the same procedures as used for system piping.

7.10.2 Two pipe termination

Maintain the required distance between vents or pairs of vents. Cut the required number of holes in the roof or sidewall for vent and combustion air pipes. Sidewall holes for two pipes vent terminations should be side-by-side, allowing space between the pipes for the elbows to fit on the pipes. Holes in the roof for two pipe terminations should be spaced no more than 18" (457 mm) apart. Termination elbows will be installed after the vent and combustion air pipe are installed.

Combustion air intake can be snorkeled to acheive 12" min distance from expected level of snow and/or ground.

Figure 23: Roof termination

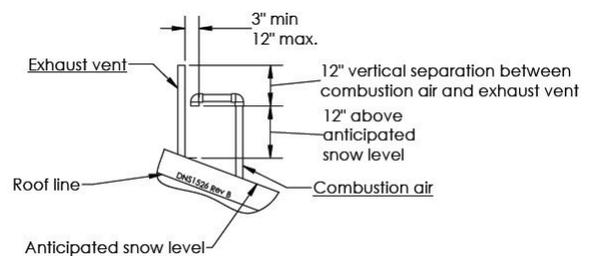


Figure 24: Standard horizontal termination

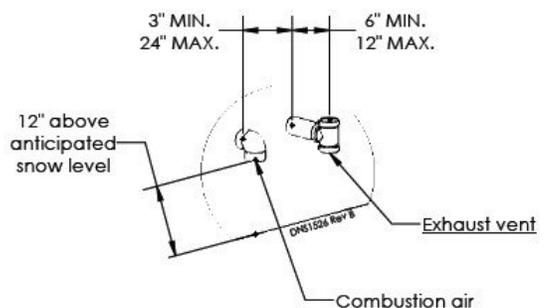


Figure 25: Alternate horizontal termination A

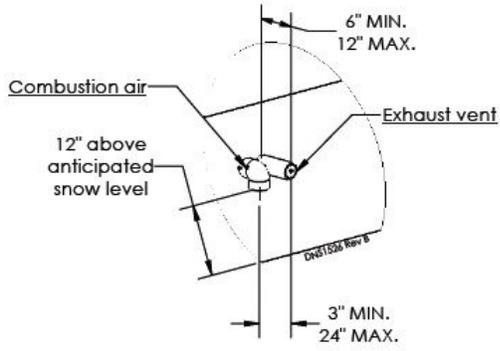


Figure 26: Alternate horizontal termination B

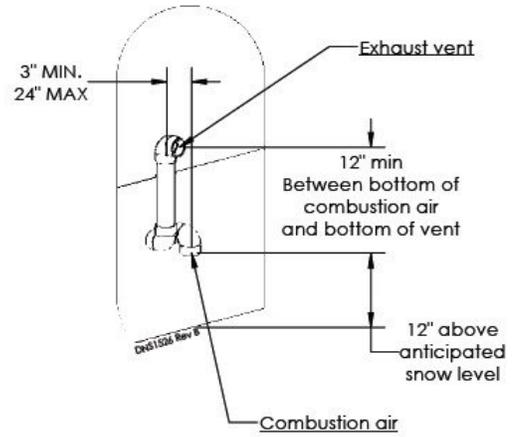


Figure 27: Alternate horizontal termination C

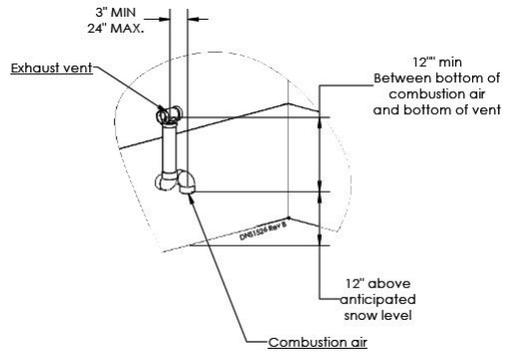


Figure 28: Venting gasket

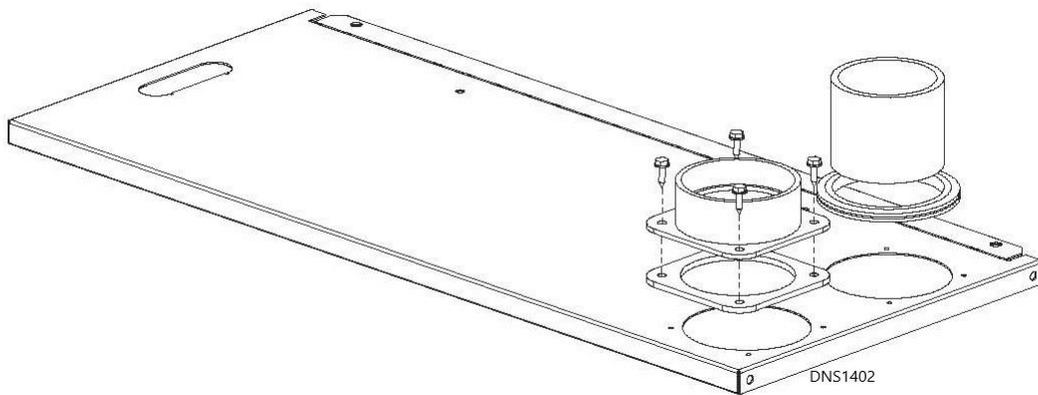
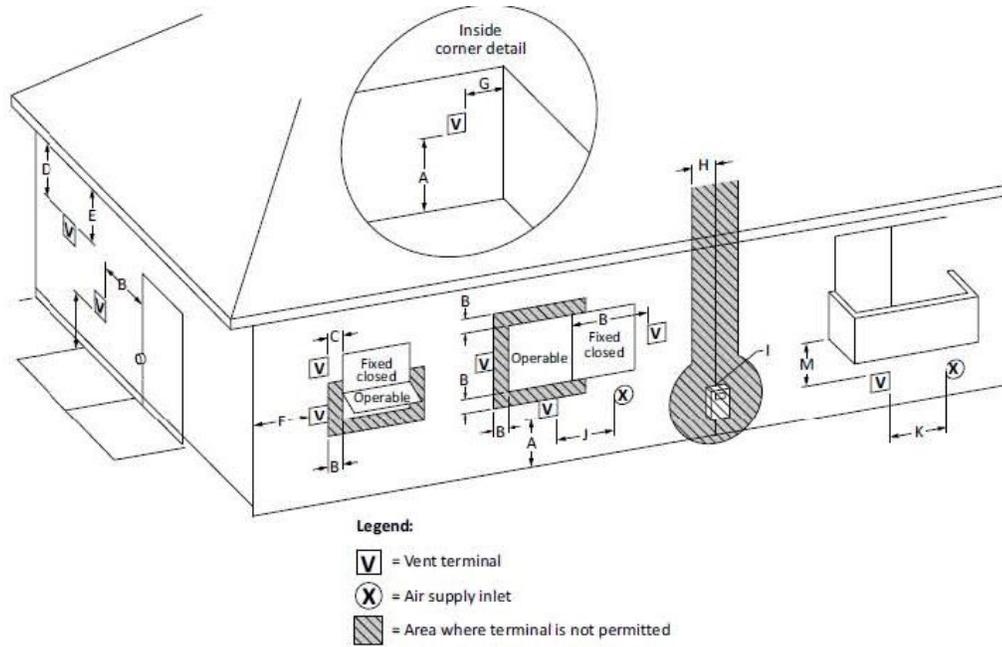


Figure 29: Direct vent clearance

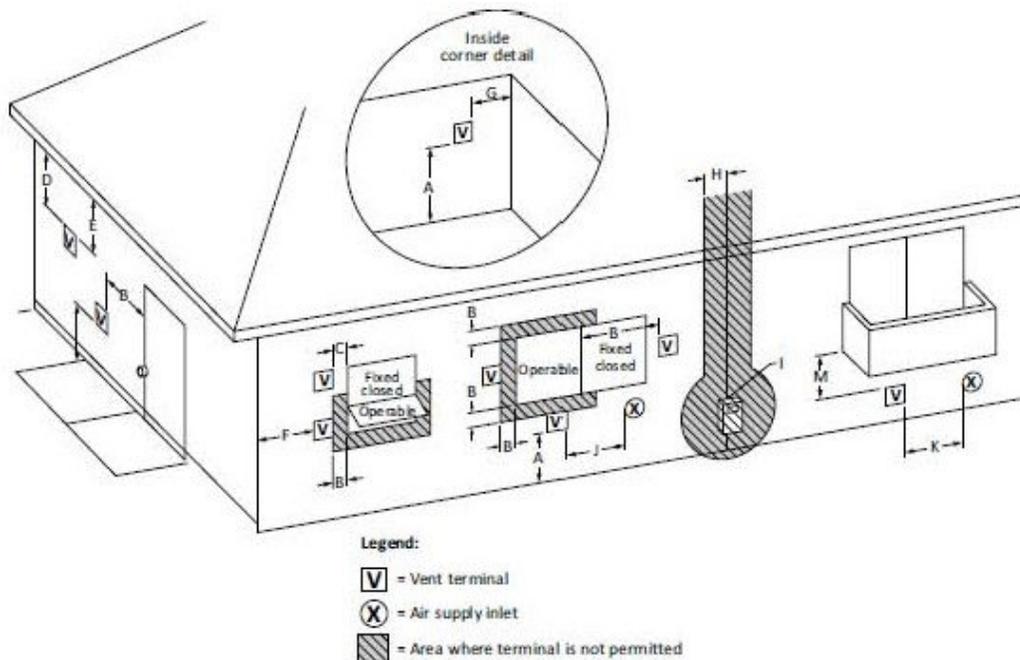


		Canadian Installations	US Installations
A	Clearance above grae, veranda, porch, deck or balcony	12 inches (30 cm)	12 inches (30 cm)
B	Clearance to window or door that may be opened	6 inches (15 cm) for appliances 10,000 Btuh (3kW), 12 inches (30 cm) for appliances > 10,000 Btuh(3kW) and 100,000 Btuh(30kW), 36 inches (91 cm) for appliances > 100,000BTUH (30kW)	6 inches (15 cm) for appliances 10,000 Btuh (3kW), 9 inches (23 cm) for appliances > 10,000 Btuh(3kW) and 50,000 Btuh(15kW), 12 inches (30 cm) for appliances > 50,000BTUH (15kW)
C	Clearance to permanently closed window	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
E	Clearance to unventilated soffit	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
F	Clearance to outside corner	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
G	Clearance to inside corner	36 inches	36 inches
H	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet (4.5 m) above the meter/regulator assembly	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
I	Clearance to service regulator vent outlet	3 feet (91 cm)	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
J	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances 10,000 Btuh (3kW), 12 inches (30 cm) for appliances > 10,000 Btuh(3kW) and 100,000 Btuh(30kW), 36 inches (91 cm) for appliances > 100,000BTUH (30kW)	6 inches (15 cm) for appliances 10,000 Btuh (3kW), 9 inches (23 cm) for appliances > 10,000 Btuh(3kW) and 50,000 Btuh(15kW), 12 inches (30 cm) for appliances > 50,000BTUH (15kW)
K	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m) ¹⁾	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
M	Clearance under veranda, porch deck or balcony	12 inches (30 cm) ²⁾	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.

Notes :

- 1) In accordance with the current CSA B149.1, Natural Gas and Propane Installation code
- 2) In accordance with the current ANI Z223.1/NFPA 54, National Fuel Gas Code
 - i- A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings
 - ii- Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

Figure 30: Other than Direct vent clearance



		Canadian Installations	US Installations
A	Clearance above gable, veranda, porch, deck or balcony	12 inches (30 cm)	12 inches (30 cm)
B	Clearance to window or door that may be opened	6 inches (15 cm) for appliances 10,000 Btuh (3kW), 12 inches (30 cm) for appliances > 10,000 Btuh(3kW) and 100,000 Btuh(30kW), 36 inches (91 cm) for appliances > 100,000 BTUH (30 kW)	4 feet (1.2 m) below or to side of openings; 1 foot (300 mm) above opening
C	Clearance to permanently closed window	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
E	Clearance to unventilated soffit	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
F	Clearance to outside corner	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
G	Clearance to inside corner	36 inches	36 inches
H	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet (4.5 m) above the meter/regulator assembly	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
I	Clearance to service regulator vent outlet	3 feet (91 cm)	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.
J	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances 10,000 Btuh (3kW), 12 inches (30 cm) for appliances > 10,000 Btuh(3kW) and 100,000 Btuh(30kW), 36 inches (91 cm) for appliances > 100,000 BTUH (30 kW)	4 feet (1.2 m) below or to side of openings; 1 foot (300 mm) above opening
K	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m)	7 feet (2.13 m)
M	Clearance under veranda, porch deck or balcony	12 inches (30 cm)	Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual.

Notes :

- 1) In accordance with the current CSA B149.1, Natural Gas and Propane Installation code
- 2) In accordance with the current ANSI Z223.1/NFPA 54, National Fuel Gas Code
- i- A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings
- ii- Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

8 START UP, ADJUSTMENT AND SAFETY CHECK

8.1 Starting the furnace

This appliance is equipped with a hot surface ignition device. This device lights the main burners each time the room thermostat calls for heat. See the lighting instructions on the furnace.

During the initial start-up, it is not unusual for odour or smoke to come out of any room registers. To ensure proper ventilation, it is recommended to open windows and doors before the initial firing.

The furnace has a negative pressure switch that is a safety during a call for heat. The induced draft blower must pull a negative pressure on the heat exchanger to close the negative pressure switch. The induced draft blower must maintain the negative pressure for the furnace to operate. If the induced draft blower fails to close or maintain the closing of the pressure switch, an error code would be displayed.

To properly start the furnace:

1. Set the thermostat to it lowest setting and turn off furnace electrical power.
2. Remove the burner compartment control access door.
3. Make sure that the manual gas control is in the "ON" position on the gas valve.
4. Replace the burner compartment control access door.

⚠ WARNING

Failure to replace the burner door can cause products of combustion to be released into the conditioned area resulting in personal injury or death.

5. Turn on the manual gas stop.
6. Turn on the furnace electrical power.
7. Put thermostat to «Heat» mode and set it at least 10°F above room temperature.
8. After the burners are lit, set the room thermostat to the desired temperature.

These furnaces are equipped with a manual reset limit switch in the burner assembly. This switch opens and shuts off the power to the gas valve if an overheat condition (flame rollout) occurs. Correct inadequate combustion-air supply or improper venting conditions before resetting the switch. **DO NOT jumper this switch.** Before operating the furnace, check the flame rollout manual reset switch for continuity. If necessary, press the button to reset the switch.

8.2 SELECTING THE BLOWER SPEED

The selection of blower speed can be adjusted using dipswitches. Each selection (A,B,C,D) refers to a different

airflow. The ideal airflow in heating and in cooling mode can be selected independently. Refer to table 11 and 12 for the tap selection and CFM tables 15 to 20 for airflows.

You also have the ability to increase or decrease airflow by approximately 15% with the «adjust» dipswitches. These setting will be applied to cooling and heating mode. Refer to table 13.

Table 11: Cooling tap selection

	A	B	C	D
S3-1	OFF	ON	OFF	ON
S3-2	OFF	OFF	ON	ON

Table 12: Heating tap selection

	A	B	C	D
S4-3	OFF	ON	OFF	ON
S4-4	OFF	OFF	ON	ON

Table 13: Adjust tap selection

	NONE	+15%	-15%	NONE
S3-3	OFF	ON	OFF	ON
S3-4	OFF	OFF	ON	ON

Table 14: CFM C15-2-V - 0381123A

Dipswitch Settings	Max ESP "w.c.	1st stage heating	2nd stage heating	Temp. rise °F	
S4-3=OFF S4-4=OFF	A	1.0	235	295	45
S4-3=ON S4-4=OFF	B	1.0	210	561	50
S4-3=OFF S4-4=ON	C	1.0	185	480	55
S4-3=ON S4-4=ON	D	1.0	170	215	60
Dipswitch Settings	Max ESP "w.c.	1st stage cooling	2nd stage cooling	FAN ON (G)	
S3-1=OFF S3-2=OFF	A	1.0	800	1 000	440
S3-1=ON S3-2=OFF	B	1.0	640	800	350
S3-1=OFF S3-2=ON	C	1.0	480	600	265
S3-1=ON S3-2=ON	D	1.0	320	400	175

Table 15: CFM C30-2-V - 0381124C

Dipswitch Settings		Max ESP "w.c.	1st stage heating	2nd stage heating	Temp. rise °F
S4-3=OFF S4-4=OFF	A	1.6	413	590	45
S4-3=ON S4-4=OFF	B	1.6	392	561	50
S4-3=OFF S4-4=ON	C	1.6	336	480	55
S4-3=ON S4-4=ON	D	1.6	280	400	65
Dipswitch Settings		Max ESP "w.c.	1st stage cooling	2nd stage cooling	FAN ON (G)
S3-1=OFF S3-2=OFF	A	1.0	800	1 000	440
S3-1=ON S3-2=OFF	B	1.6	640	800	350
S3-1=OFF S3-2=ON	C	1.6	480	600	265
S3-1=ON S3-2=ON	D	1.6	320	400	175

Table 16: CFM C45-2-V - 0381125C

Dipswitch Settings		Max ESP "w.c.	1st stage heating	2nd stage heating	Temp. rise °F
S4-3=OFF S4-4=OFF	A	1.6	480	685	58
S4-3=ON S4-4=OFF	B	1.6	510	730	55
S4-3=OFF S4-4=ON	C	1.6	420	600	65
S4-3=ON S4-4=ON	D	1.6	350	500	80
Dipswitch Settings		Max ESP "w.c.	1st stage cooling	2nd stage cooling	FAN ON (G)
S3-1=OFF S3-2=OFF	A	1.0	800	1000	440
S3-1=ON S3-2=OFF	B	1.6	640	800	350
S3-1=OFF S3-2=ON	C	1.6	480	600	265
S3-1=ON S3-2=ON	D	1.6	320	400	175

Table 17: CFM C60-2-V - 0381209C

Dipswitch Settings		Max ESP "w.c.	1st stage heating	2nd stage heating	Temp. rise °F
S4-3=OFF S4-4=OFF	A	1.0	685	985	55
S4-3=ON S4-4=OFF	B	1.0	820	1175	45
S4-3=OFF S4-4=ON	C	1.0	755	1085	50
S4-3=ON S4-4=ON	D	1.0	720	1035	50
Dipswitch Settings		Max ESP "w.c.	1st stage cooling	2nd stage cooling	FAN ON (G)
S3-1=OFF S3-2=OFF	A	1.0	1115	1400	700
S3-1=ON S3-2=OFF	B	1.0	955	1200	600
S3-1=OFF S3-2=ON	C	1.0	800	1000	500
S3-1=ON S3-2=ON	D	1.0	635	800	400

Table 18: CFM C75-2-V - 0381210C

Dipswitch Settings		Max ESP "w.c.	1st stage heating	2nd stage heating	Temp. rise °F
S4-3=OFF S4-4=OFF	A	1.0	820	1180	56
S4-3=ON S4-4=OFF	B	1.0	834	1200	55
S4-3=OFF S4-4=ON	C	1.0	840	1210	55
S4-3=ON S4-4=ON	D	1.0	810	1160	57
Dipswitch Settings		Max ESP "w.c.	1st stage cooling	2nd stage cooling	FAN ON (G)
S3-1=OFF S3-2=OFF	A	1.0	1120	1400	435
S3-1=ON S3-2=OFF	B	1.0	960	1203	375
S3-1=OFF S3-2=ON	C	1.0	800	1000	310
S3-1=ON S3-2=ON	D	1.0	640	800	250

Table 19: CFM C105-2-V - 0381315C

Dipswitch Settings		Max ESP "w.c.	1st stage heating	2nd stage heating	Temp. rise °F
S4-3=OFF S4-4=OFF	A	1.0	1130	1590	58
S4-3=ON S4-4=OFF	B	1.0	1280	1800	51
S4-3=OFF S4-4=ON	C	1.0	1170	1640	56
S4-3=ON S4-4=ON	D	1.0	1100	1545	60
Dipswitch Settings		Max ESP "w.c.	1st stage cooling	2nd stage cooling	FAN ON (G)
S3-1=OFF S3-2=OFF	A	1.0	1440	1800	900
S3-1=ON S3-2=OFF	B	1.0	1275	1600	800
S3-1=OFF S3-2=ON	C	1.0	1120	1400	700
S3-1=ON S3-2=ON	D	1.0	960	1200	600

Table 20: CFM C120-2-V - 0381316B

Dipswitch Settings		Max ESP "w.c.	1st stage heating	2nd stage heating	Temp. rise °F
S4-3=OFF S4-4=OFF	A	1.0	1400	2000	53
S4-3=ON S4-4=OFF	B	1.0	1780	2540	42
S4-3=OFF S4-4=ON	C	1.0	1580	2260	47
S4-3=ON S4-4=ON	D	1.0	1300	1860	57
Dipswitch Settings		Max ESP "w.c.	1st stage cooling	2nd stage cooling	FAN ON (G)
S3-1=OFF S3-2=OFF	A	1.0	1600	2000	1000
S3-1=ON S3-2=OFF	B	1.0	1440	1800	900
S3-1=OFF S3-2=ON	C	1.0	1270	1600	800
S3-1=ON S3-2=ON	D	1.0	1115	1400	700

8.3 DELAY TO FAN OFF

The fan delay to off can be adjust using dipswitch S7-3 and S7-4.

Table 21: Heat fan off delay with 2 stage ECM furnace

S7-3	S7-4	TIME
OFF	OFF	90 SEC
OFF	ON	120 SEC
ON	OFF	150 SEC
ON	ON	180 SEC

8.4 DEHUMIDIFICATION

If the thermostat has a DH terminal to handle dehumidification, set DIP switch S5-2 to OFF.

Table 22: Dehum DIP switches

S5-2	OFF	DEHUMIDIFIER INSTALLED
S5-2	ON	NO DEHUMIDIFIER (default)

8.5 HEAT MODE

When the thermostat calls for heat the control verifies that the pressure switches are open and energizes the inducer blower (high speed) and optional humidifier output. When the low pressure switch closes, a 15 sec pre-purge begins. Then, the inducer goes into low speed and the ignitor is energized. It warms up for 17 sec and the gas valve is energized on low fire. If a flame is detected, a 45 sec blower on delay begins. When the thermostat initiates sec stage, the inducer is energized at high speed. This closes the sec stage inducer pressure switch, then energizes the sec stage on the gas valve and the high heat circulator speed.

8.6 COOL MODE

In a typical system, a call for cooling is initiated by closing Y and G. This will energize the compressor and the optional electric air cleaner. After the thermostat is satisfied, the compressor is de-energized and the control starts a blower 60 sec off delay.

8.7 FAN ON MODE

If the thermostat fan switch is moved to the ON position, the (optional) electric air cleaner and the G circulator output to the circulator motor will be energized. The airflow for each models are in tables 15 to 20. When the fan switch to AUTO position on the thermostat, the G circulator output and the electronic air cleaner are de-energized.

8.8 FURNACE TWINNING

No twinning is allowed with ECM motors.

8.9 ERROR CODES

The control continuously monitors its own operation and the operation of the system. If a failure occurs the diagnostic indicator LED will flash a red failure code. Please see table 25 for error code details.

If a failure is internal to the control, the red indicator will stay on continuously. In this case, the entire control should be replaced as the control is not field-repairable. If the LED is continuously off, there may be no power to the control or a failure within the control.

To retrieve fault codes, push and release the «last error» button for more than 1 second and less than 5 seconds. The LED

will flash up to five stored fault codes, beginning with the most recent.

8.10 SAFETY CHECK

8.10.1 Prime drain trap

Failure to follow this check may result in intermittent unit operation or bad performance. Condensate trap must be PRIMED or proper draining may not occur. The condensate trap has three internal chambers which can be primed by pouring water into the side or top drain inlet of condensate trap.

8.10.2 Furnace commissioning

Be sure to fill section 11 : Furnace info.

9 OPERATING YOUR FURNACE

These furnaces are equipped with an ignition device which automatically lights the burners. **Do not try to light the burners by hand.**

Before operating, smell around the furnace area for gas. Be sure to smell near floor because some gases are heavier than air and will settle to the lowest point. See section 9.1 if the odour of gas is present. Use only your hand to turn the gas control knob; never use tools. If the knob will not turn by hand, don't try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.

9.1 WHAT TO DO IF YOU SMELL GAS

WARNING

FIRE OR EXPLOSION HAZARD

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

-Do not store or use gasoline or other flammable vapors and liquids 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.

Leave the building immediately.

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

-Installation and service must be performed by a qualified installer, service agency or the gas supplier.

9.2 SHUTTING DOWN THE FURNACE

9.2.1 To turn off gas to furnace

1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the furnace if service is to be performed.
3. Remove the burner compartment access panel.
4. Move the gas control knob or switch to "OFF" . Do not force.

5. Replace the burner compartment access panel.

10 MAINTENANCE OF YOUR FURNACE

There are routine maintenance steps you should take to keep your furnace operating efficiently. This maintenance will assure longer life, lower operating costs, and fewer service calls.

In addition to the maintenance procedures listed in this manual, there are other service and maintenance procedures that require the skills of a service person with specialized tools and training. Personal injury can result if you are not qualified to do this work. Please call your dealer when service is needed.

Your gas furnace is designed to give many years of efficient, satisfactory service. However, the varied air pollutants commonly found in most areas can affect longevity and safety. Chemicals contained in everyday household items such as laundry detergents, cleaning sprays, hair sprays, deodorizers, and other products which produce airborne residuals may have an adverse effect upon the metals used to construct your appliance. The cabinet of the furnace can be cleaned with soap and water. Grease spots can be removed with a household cleaning agent.

It is important that you conduct periodic physical inspections of your appliance, paying special attention to the gas burner and the flue outlet from the furnace. These components are located on the front of the unit. A flashlight will be useful for these inspections. Make one inspection prior to the beginning of the heating season and another during the middle.

Should you observe unusual amounts of any of the following conditions, it is important that you call your authorized dealer at once to obtain a qualified service inspection:

- Rust, flakes, or other deposits
- Corrosion

Even if no unusual conditions are observed, it is recommended that the furnace be inspected and serviced at least once a year by a qualified service technician. Regular inspections and planned maintenance will assure many years of economic performance from your gas furnace.

10.1 CLEANING/REPLACING THE FILTER

It is very important to clean or replace the air filter regularly. Dirty filters are the most common cause of inadequate heating or cooling performance and can sharply increase the operational costs of your unit. In some cases, they can double

the cost. The air filter should be inspected at least every 6 weeks and cleaned or replaced as required.

Your furnace may use either a disposable filter or a cleanable filter. The type of filter may be indicated on a label attached to the filter. If a disposable filter is used, replace with the same type and size. To remove excess dirt from a cleanable filter, shake and/or use a vacuum cleaner. Wash the filter in soap or detergent water and reinstall after filter is dry.

Cleanable filters do not need to be oiled after washing. Cleanable filters may be replaced with disposable filters.

10.2 LUBRICATION

The bearings in the circulating air blower motor and the combustion blower motor do not need lubrication.

10.3 CONDENSATE COLLECTION AND DISPOSAL SYSTEM

The condensate system must not be exposed to temperatures under 32°F.

Make sure the condensate drain line does not become blocked or plugged. Visual inspection of condensate flow can easily be done while the furnace is operating. Use a flashlight to illuminate discharge end of the condensate drain that is placed in the sewer opening. The furnace will not operate properly if the condensate drain line becomes blocked or plugged. If this event occurs, have the furnace inspected by a qualified service technician.

10.4 ROLLOUT SWITCH

This unit is equipped with a manual reset high temperature sensor or rollout switch. In the unlikely event of a sustained burner flame rollout, the rollout switch will shut off the flow of gas by closing the gas valve. The switch is located inside the gas burner area. Flame rollout can be caused by blockage of the power vent system, a blocked heat exchanger, or improper gas pressure or adjustment. If this event occurs, the unit will not operate properly. The gas supply to the unit should be shut off and no attempt should be made to place it in operation. The system should be inspected by a qualified service technician.

10.5 SAFETY INTERLOCK SWITCH

The blower compartment door on your high efficiency gas furnace is equipped with a safety interlock switch that will automatically shut off your complete system (including blower) once the door is removed. This is for your personal safety. Be sure to check your furnace for proper operation once the door or panel has been replaced. If the system does not operate once the panel has been replaced, try removing and replacing it once again. If the furnace still does not operate, call your dealer for service.

Figure 31: Dimensions

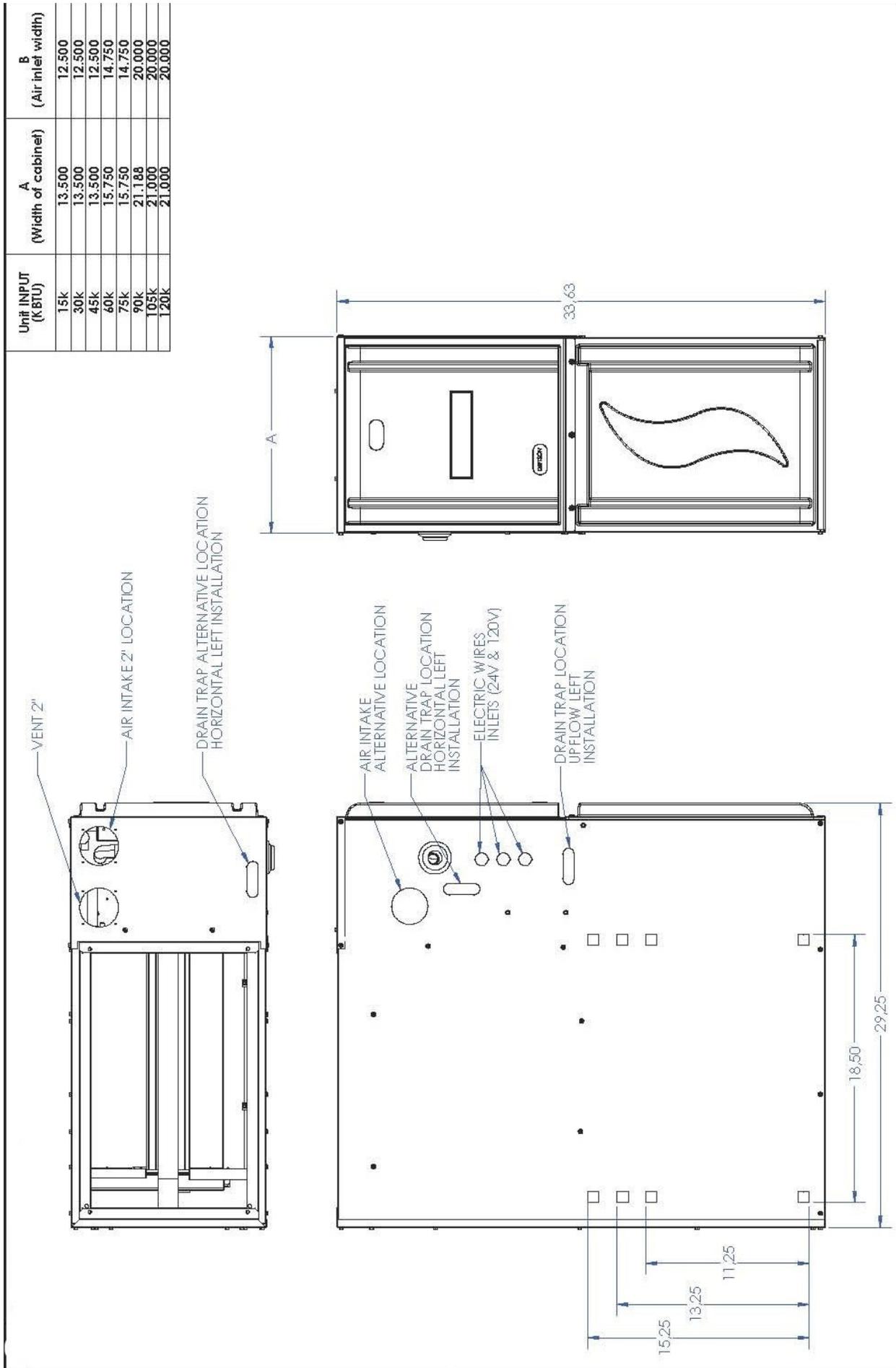


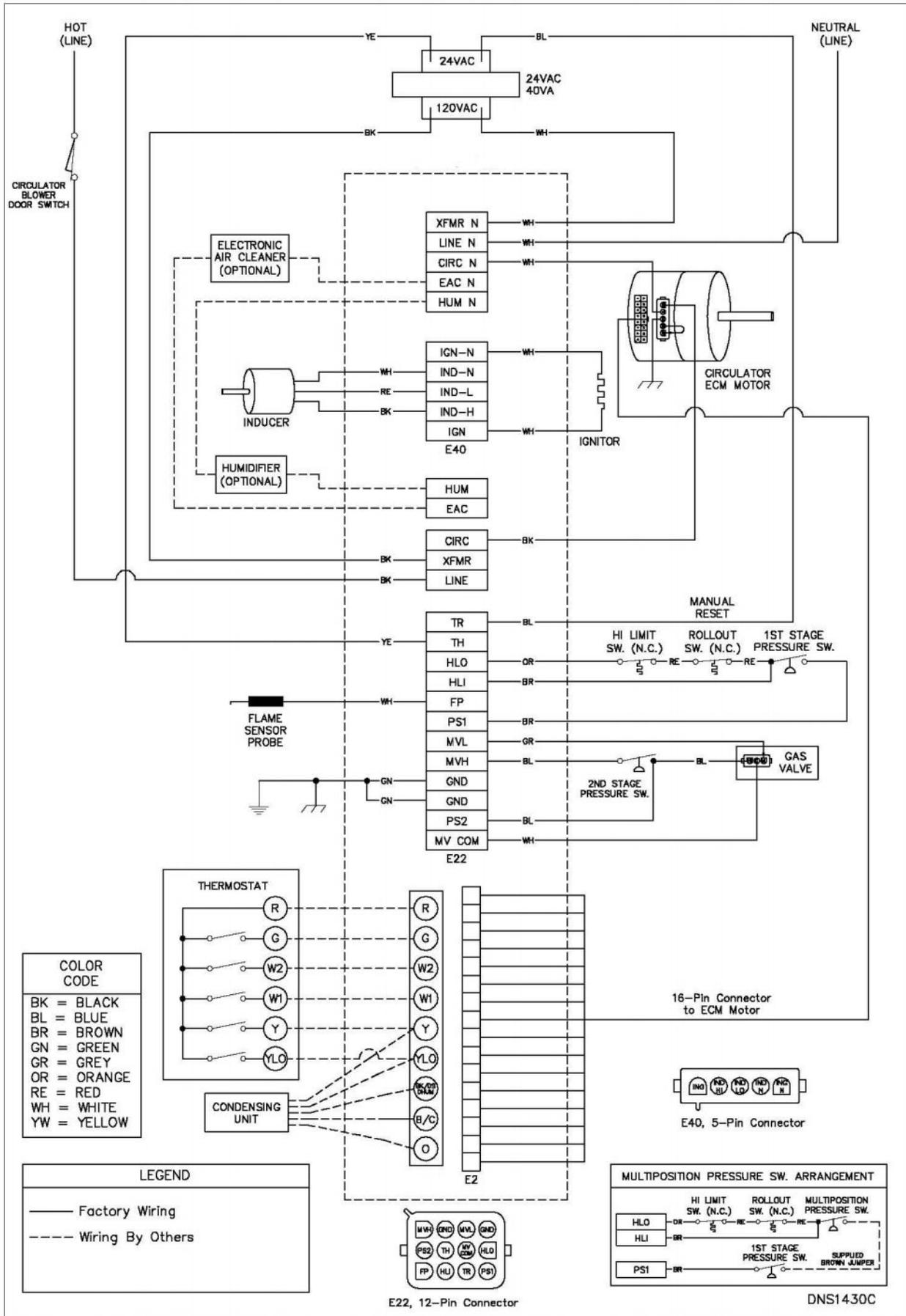
Table 23: Electrical data

UNIT SIZE	VOLT-HERTZ-PHASE	OPERATING VOLT RANGE	MAX AMPS	UNIT	UNIT AMPACITY	BREAKER AMPS
30 000	120-60-1	104-127	10.7		12.7	15
45 000	120-60-1	104-127	10.7		12.7	15
60 000	120-60-1	104-127	12.6		15	15
75 000	120-60-1	104-127	12.6		15	15
105 000	120-60-1	104-127	15.8		19	20
120 000	120-60-1	104-127	15.8		19	20

Table 24: Specifications

<i>Model</i>		C15-2-V	C30-2-V	C45-2-V	C60-2-V	C75-2-V	C105-2-V	C120-2-V
INPUT (BTU/H)	HIGH	15 000	30 000	45 000	60 000	75 000	105 000	120 000
	LOW	10 500	21 000	31 500	42 000	52 500	73 500	84 000
OUTPUT (BTU/H)	HIGH	14 400	28 890	43 200	57 420	71 925	100 065	115 560
	LOW	10 080	20 223	30 240	40 194	50 350	70 050	80 900
EFFICIENCY % (AFUE)		96.2	96.3	96.0	95.7	95.9	95.3	96.3
TEMP. RISE		25 – 55 °F (14 – 30°C)	30-60°F (16-34°C)	40 - 70°F (22 - 39°C)				
AIRFLOW (CFM)	HEATING HIGH	335	595	730	985	1 180	1 590	2 000
	HEATING LOW	265	415	510	685	820	1 130	1 400
	MAX	1 000	1 000	1 000	1 400	1 400	1 800	2 000
MAX COOLING CAPACITY (TONS)		2.5	2.5	2.5	3.5	3.5	4.5	5.0
MOTOR HP		1/2	1/2	1/2	3/4	3/4	1	1
BLOWER		12" X 6"	12" X 6"	12" X 6"	12" X 8"	12" X 9"	12" X 11"	12" X 11"

Figure 32: Two Stage ECM Wiring diagram



11 FURNACE SPECIFICATION

Furnace model:
Serial number:
Furnace orientation:
Fuel (N.gas/propane):
Conversion kit number:
Inlet gas pressure:
Outlet gas pressure high fire (100%):
Outlet gas pressure low fire (70%):
Static pressure in return:
Static pressure in supply:
Temperature rise:
Is drain trap filled with water?:
Is drain trap outlet vented with a Tee?:
Are condensate tubing properly slopped towards drain trap?:
Furnace leveled or slopped?:
Venting pipe diameter:
Venting length:
Venting termination:

Table 25: Error Codes

Green LED Flash	Amber LED Flash	Red LED Flash	Erreur/Conditions	Comments/Troubleshooting
			Furnace doesn't operate. Control board LED's are off.	Door switch is defective or open. There is no 120V to the board.
		1	Flame sense when no flame should be present.	Verify the gas valve is operating and shutting down properly. Flame in the burner assembly should extinguish promptly at the end of the cycle.
		2	Pressure switch stuck closed	Faulty pressure switch, pressure switches wires shorted, control board inducer relay stuck closed
		3	First stage pressure switch stuck open	Faulty pressure switch or tubing or wiring, control board inducer relay failed, restriction at the vent, blocked vent
		4	High limit and/or rollout switch open	Verify temperature rise and airflow, duct static pressure, burners alignment, wiring to both switch (high limit and rollout).
		5	Open fuse	Check fuse and replace.
		6	Pressure switch lockout, pressure switch has opened 5 times in a heating cycle.	Check for venting restriction, verify pressure switch tubing for leaks.
		7	Lockout after multiple failed ignition.	Check gas pressure and gas valve. Make sure flame rod is clean and properly wired. Check ignitor and its connection.
		8	Lockout after multiple flame lost.	Check gas pressure and gas valve. Make sure flame rod is clean and properly wired.
		9	Improper grounding or polarity	120V hot and neutral reversed. 120V should be read between Hot and ground. 0V should be read between Neutral and ground.
		10	Gas valve current detected with no call for heat.	Verify if any electrical short could send voltage/current to the gas valve. If not, replace control board.
		11	Open limit switch for more than 5 minutes.	Reset the unit and verify blower is functioning at proper speed. Verify temperature rise and airflow, duct static pressure, burners alignment, wiring to both switch (high limit and rollout).
		12	Ignitor relay on control board is not functioning.	Replace control board.
		Solid ON	Internal control board error	Reset control. Replace control board if error code is still present.
		3 double	Second stage pressure switch stuck open.	Check for faulty pressure switch, tubing or wiring. Check for restriction at the vent. Make sure inducer blower is functioning properly.
	1			Normal operation with call for first stage heating.
	2			Normal operation with call for second stage heating.
	3		Call on W2 without call on W1	Verify thermostat and wiring.
	4		Call on Y or Ylo without call on G	Verify thermostat and wiring.
	Rapide		Low flame sense	Clean flame rod with steel wool. Check gas outlet pressure.
1				Normal operation with call for 1st stage cooling.
2				Normal operation with call for 2nd cooling or Single stage cooling.
Rapid				Normal operation with call for fan on.
Solid On				Normal operation, standby mode

Figure 33: Exploded view Cxx-2-V part 1

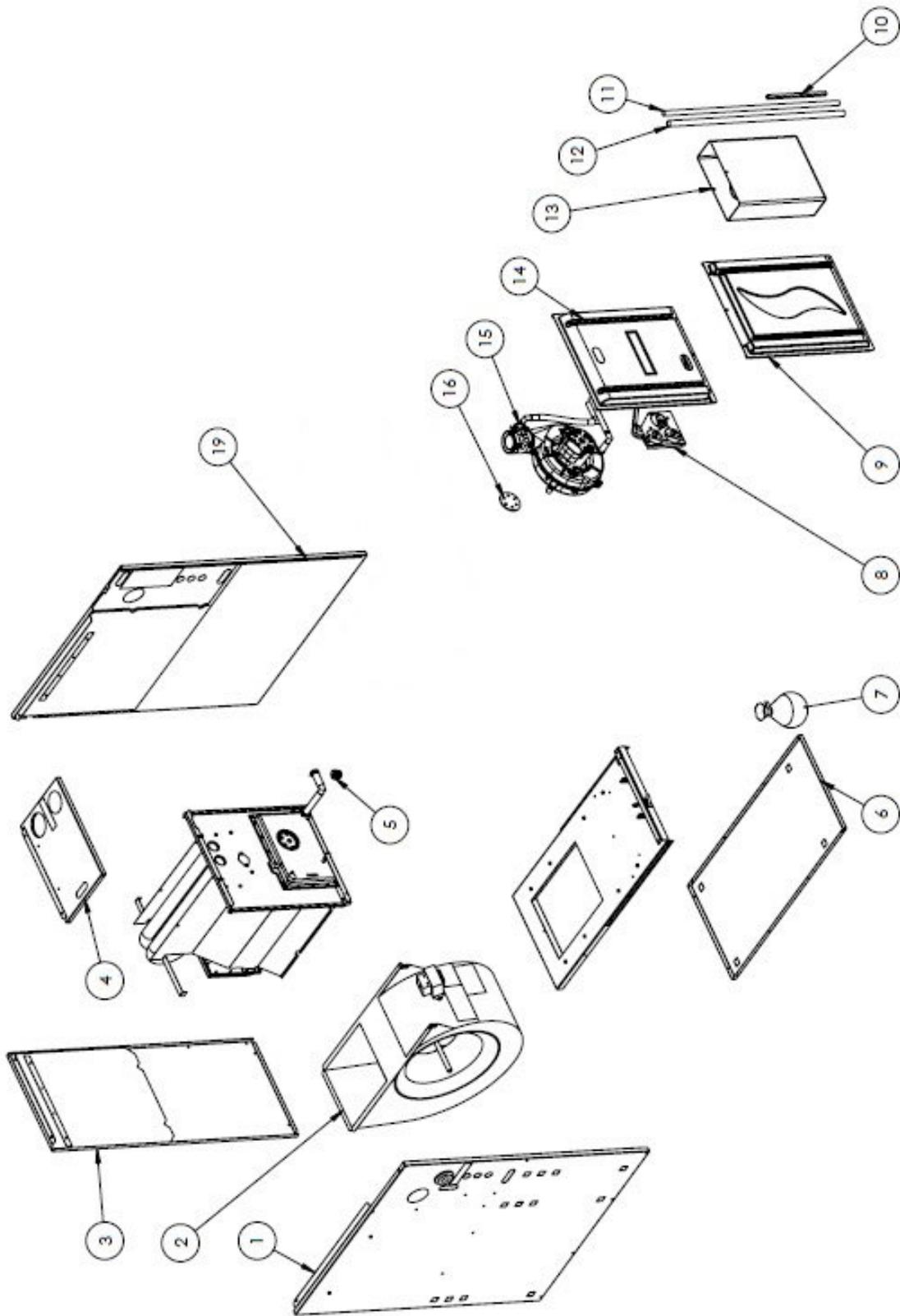


Figure 34: Exploded view Cxx-2-V part 2

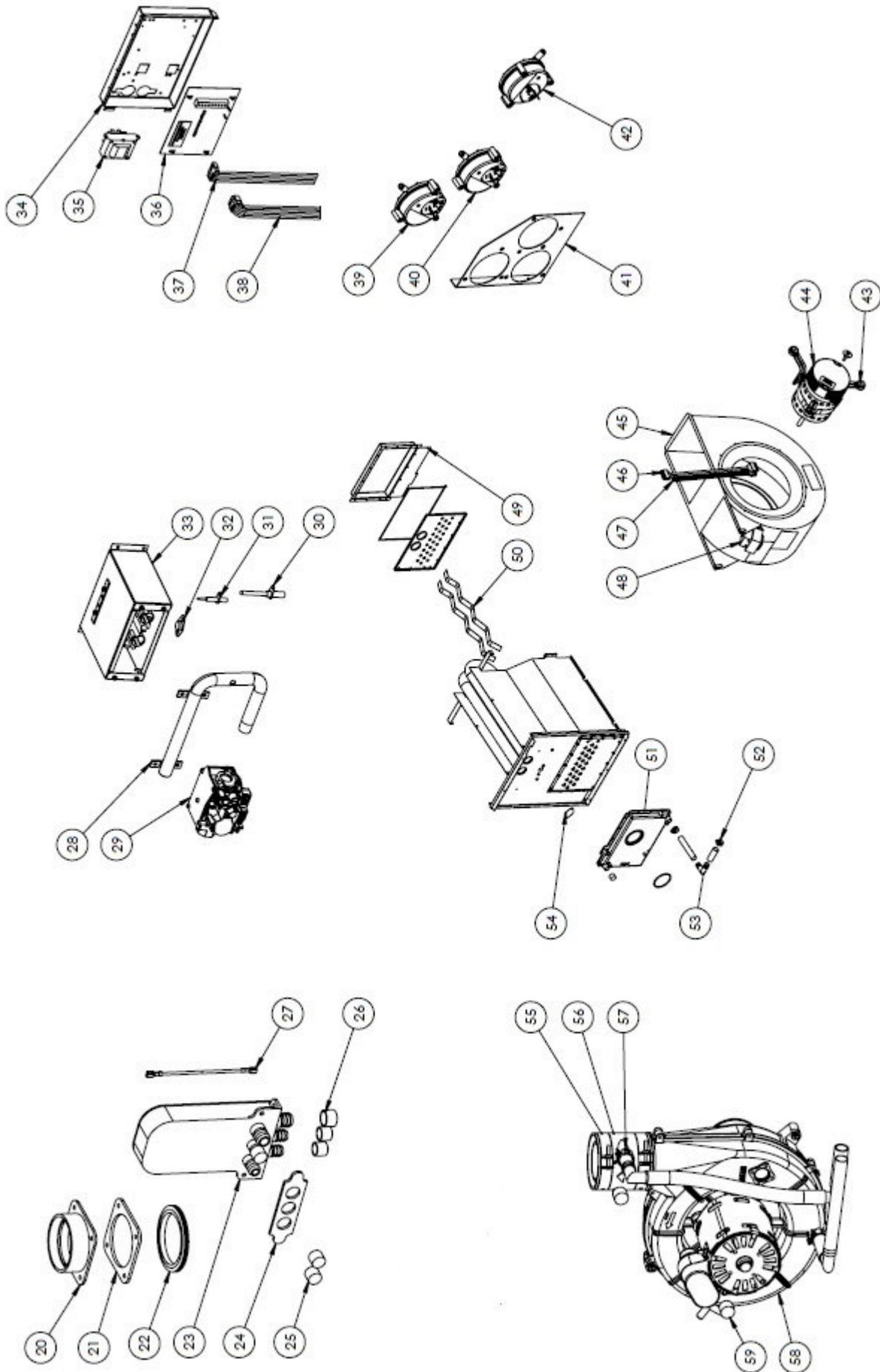


Table 26: Part List CXX-2-V

#	DESCRIPTION	C15-2-V	C30-2-V	C45-2-V	C60-2-V	C75-2-V	C105-2-V	C120-2-V
1	Left panel ass.	B40509-01						
2	Blower ass.	B40604-01	B40604-02	B40604-03	B40604-04	B40604-05	B40604-07	B40604-08
3	Back panel ass.	B40511-01	B40511-01	B40511-01	B40511-02	B40511-02	B40511-03	B40511-03
4	Top panel ass.	B40512-01	B40512-01	B40512-01	B40512-02	B40512-02	B40512-03	B40512-03
5	Strain Relief	L04I013						
6	Floor	B40546-01	B40546-01	B40546-01	B40546-02	B40546-02	B40546-03	B40546-03
7	Extruded Sealant 1/8" dia. (25 ft)	J06L002						
8	Pressure Switch ass.	B40675-17	B40675-18	B40675-19	B40675-20	B40675-21	B40675-23	B40675-24
9	Bottom door ass.	B40570-07	B40570-07	B40570-07	B40570-08	B40570-08	B40570-09	B40570-09
10	Square black tubing 3/16" dia. (12 in)	B30157-39						
11	1/2" dia. tubing (24 in.)	B30157-38						
12	5/8" dia. tubing (24 in.)	B30157-34						
13	Miscellaneous part bag	B40569-01						
14	Upper door ass.	B40571-01	B40571-01	B40571-01	B40571-02	B40571-02	B40571-03	B40571-03
15	Inducer blower ass.	B40578-05	B40578-05	B40578-05	B40578-08	B40578-08	B40578-08	B40578-08
16	Restriction disk	B40563-01	B40910	B40699	B40563-04	B40698	B40563-06	-
19	Right panel ass.	B40510-33						
20	Combustion air venting flange	B40533						
21	Venting flange gasket	B40567						
22	Venting flange gasket	B40903						
23	Drain trap	B40760						
24	Drain trap gasket	B40568						
25	1/2" dia. caps	G14G013						
26	5/8" dia. caps	G14G014						
27	Brown jumper	A00338-05						
28	Manifold	B40576	B40577	B40527	B40528	B40529	B40531	B40532
29	Gas valve	R01I003						
30	Ignitor	R03K005						
31	Flame sensor	R03J005						
32	Roll out switch	R02N022						
33	Burner box	B40908-01	B40908-02	B40908-03	B40908-04	B40908-05	B40908-07	B40908-08
34	Control board support	B40559						
35	Transformer 120V-24V	L01F009						
36	Control board	R99G016						
37	Ignitor electric harness	B40592-01	B40592-01	B40592-01	B40592-02	B40592-02	B40592-02	B40592-02
38	Main harness	B40593-01	B40593-01	B40593-01	B40593-02	B40593-02	B40593-02	B40593-02
39	High fire pressure switch	R99F044	R99F043	R99F043	R99F042	R99F048	R99F039	R99F041
40	Low fire pressure switch	R99F046	R99F050	R99F039	R99F050	R99F050	R99F050	R99F050
41	Pressure switches support	B40560						
42	Multiposition pressure switch (-0.2"w.c.)	R99F035						
43	Motor belly band kit	B01889						
44	Programmed Motor	B03240-10	B03240-11	B03240-12	B03716-02	B03716-03	B03241-09	B03241-10
45	Blower	Z01I033	Z01I033	Z01I033	Z01I035	Z01I036	Z01I038	Z01I038
46	Blower electronic harness	B03242-04	B03242-04	B03242-04	B03242-05	B03242-05	B03242-05	B03242-05
47	Blower electric harness	B40581-04						
48	Inductance	B03141-02	B03141-02	B03141-02	B03141-01	B03141-01	B03141	B03141
49	Smoke Box	B40539-01	B40539-01	B40539-01	B40539-02	B40539-02	B40539-03	B40539-04
50	Primary heat exchanger baffle	B40572						
51	Condensate box	B40526-01	B40526-01	B40526-01	B40526-02	B40526-02	B40526-03	B40526-04
52	5/8" spring hose clamp	G99Z035						
53	Barbed elbow 5/8" dia.	G07J007						
54	Thermodisk	R02N027	R02N024	R02N026	R02N024	R02N023	R02N024	R02N024
55	Hose clamp	G99Z033						
56	Rubber venting drain	B40580						
57	1/2" spring hose clamp	G99Z034						
58	Inducer blower 2-Stage	Z01K006K						
59	Barbed elbow 1/2" dia.	G07J006						
ACCESSORIES								
	Bottom return base	B40691-01	B40691-01	B40691-01	B40691-02	B40691-02	B40691-03	B40691-03
	Downflow base	B40632-01	B40632-01	B40632-01	B40632-02	B40632-02	B40632-03	B40632-03
	Propane conversion kit	B40574-02	B40574-05	B40574-08	B40574-11	B40574-14	B40574-20	B40574-23
	Propane orifice #56	R04I002						
	Natural gas orifice #48	R04I001						