# INSTALLATION INSTRUCTIONS AND HOMEOWNER'S MANUAL:
# GAS FIRED FURNACE SINGLE STAGE PSC, 2-STAGE PSC, SINGLE STAGE ECM


## GAS FURNACE
## MULTIPOSITION

## Models:

**C45-1-X**/C45-1-D*/C45-2-D*/

C60-1-X*/C60-1-D*/C60-2-D*

C75-1-X*/C75-1-D*/C75-2-D*

C105-1-X*/C105-1-D*/C105-2-D*

C120-1-X*/C120-1-D*/C120-2-D*

Models marqued with an * are only sold in Quebec

Models **in bold** can be sold in US and 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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# 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 15 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 dammage. Improper installation, adjustement, 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 equipement, 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**

**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**

**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 disconneting. Reconnect wires correctly.**

**-Verify proper operation after servicing.**

**⚠ 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**

# 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 part list table

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:

**Table 1 – Codes and Standards**

| 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 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 accomodate an installation's gas, electrical, drain trap and venting/combustion air piping. If the combustion air is installed to the side of the furnace, additionnal clearance must be provided.

### 2.3.2 Location relative to cooling equipement

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 part list tables 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.**

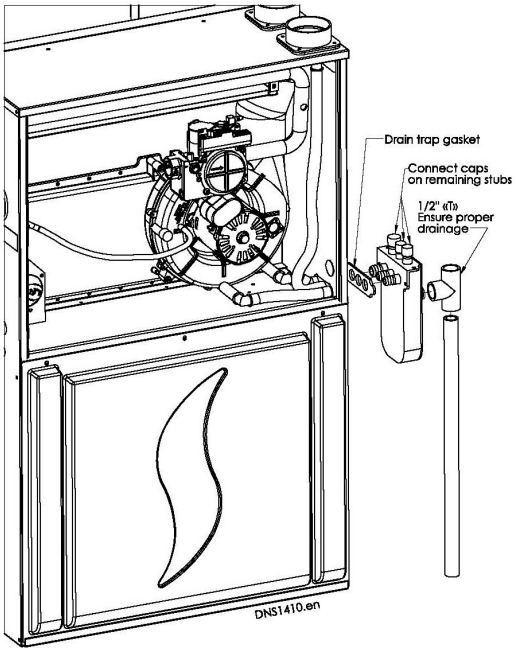
## 3.1 UPFLOW

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 foward.

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**



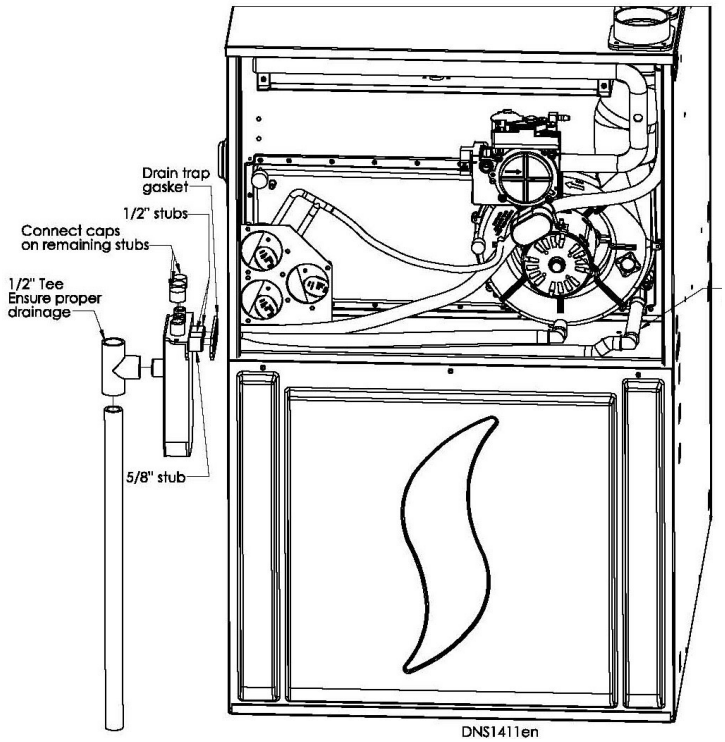

**See figure 1 and read the following instructions:**

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 ½" 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 ½" 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 ½" and are connected to the ½" 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 ½" 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

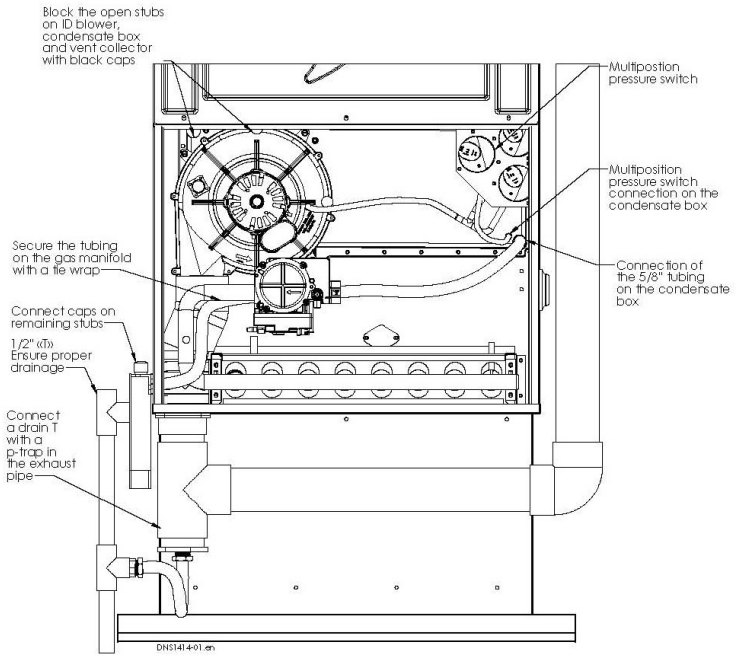
**⚠ CAUTION**

**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 foward 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.

11. Si une pompe a condensat doit être utilisée, assurez-vous qu'elle soit compatible avec le condensat acide.

### 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. (see figure 5)

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 4 for more details.

**Figure 4 – Downflow position pressure switch assembly**

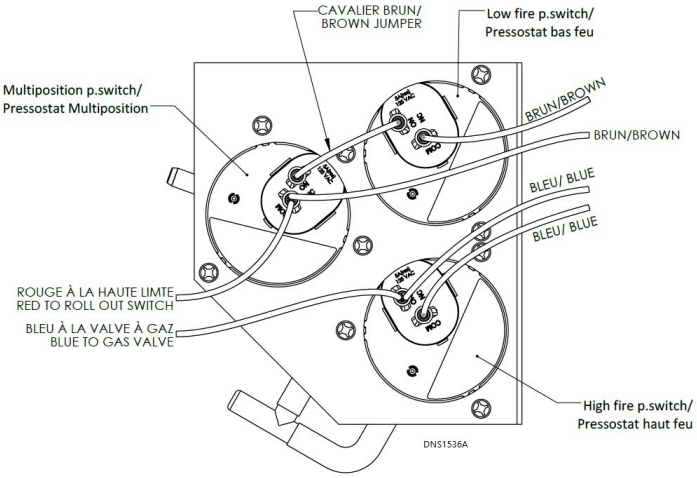
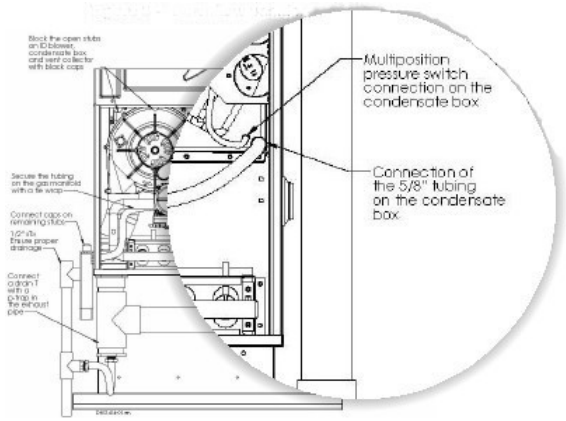



**Figure 5 – Connecting pressure switch in downflow position**




## 3.3 HORIZONTAL RIGHT

**Figure 6 – Horizontal right position**

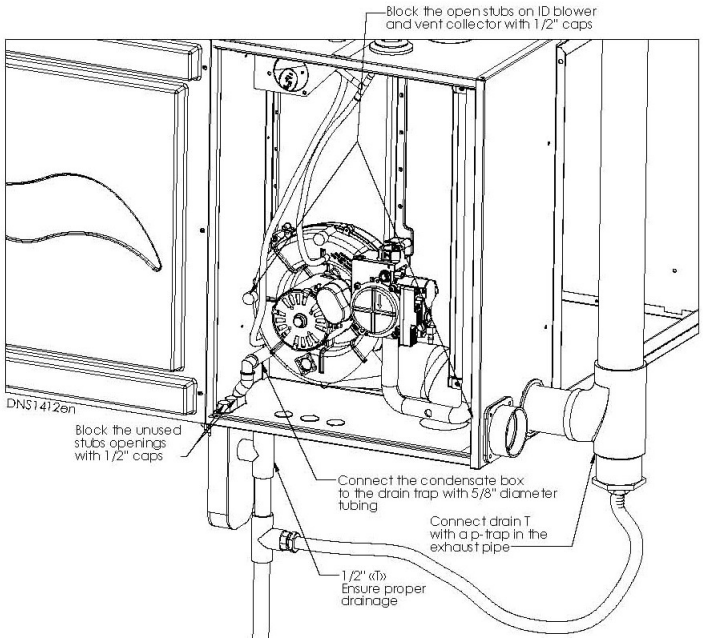
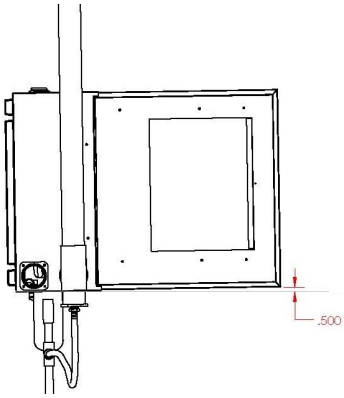



**Figure 7 – Horizontal right slope**




When installing the furnace in horizontal right position, make sure the furnace is tilted foward to make it drain properly. Refer to figure 7.

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 6.

### 3.3.1 Horizontal right condensate drain trap connection

REFER TO FIGURE 6 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 8 – Horizontal right pressure switch connection**

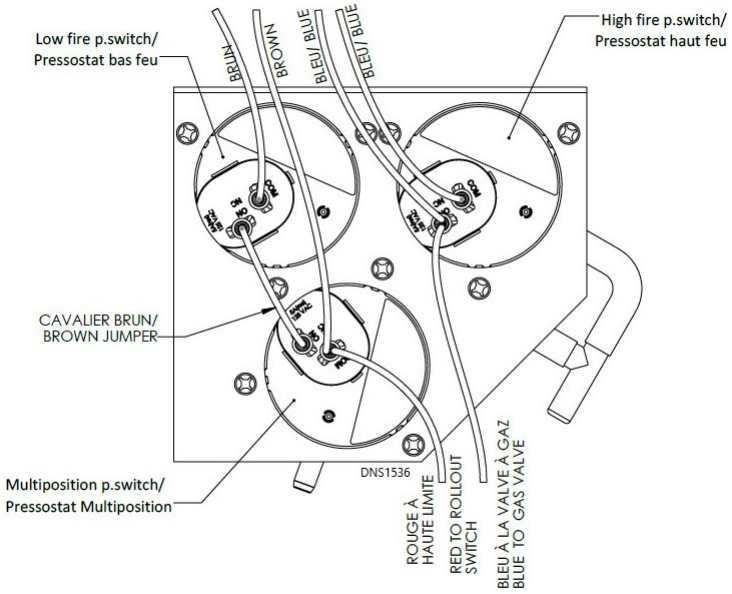
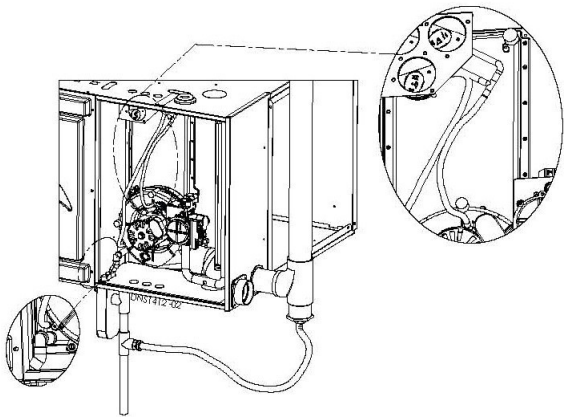


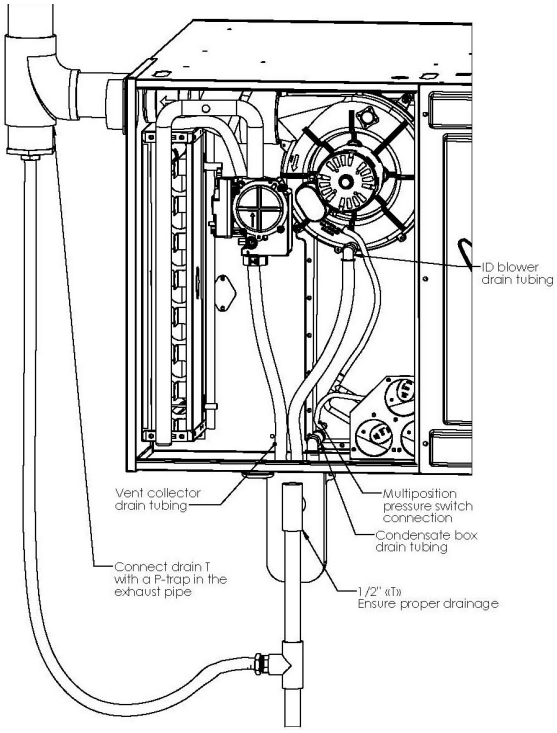

**Figure 9 – Horizontal right pressure switch tubing**



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 6 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 figure8 (Horizontal right pressure switch connection) for more details.

## 3.4 HORIZONTAL LEFT

**Figure 10 – Horizontal left position**



### 3.4.1 Horizontal left condensate drain trap connection

REFER TO FIGURE 10 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 constraint)

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.

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.

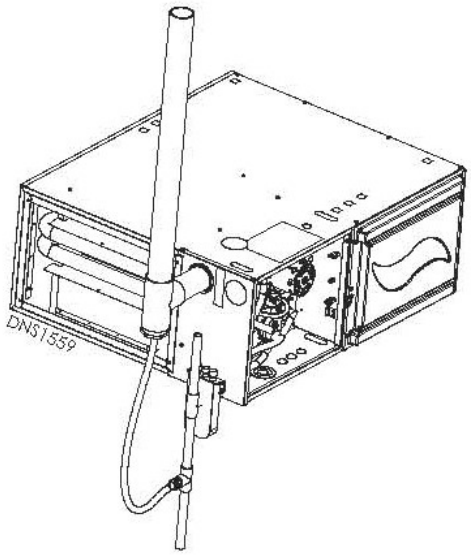
9. Connect the outlet from the drain trap to the condensate drain piping using a ½” PVC tee. If a condensate pump is used, make sure it is approved for acidic condensate.

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.

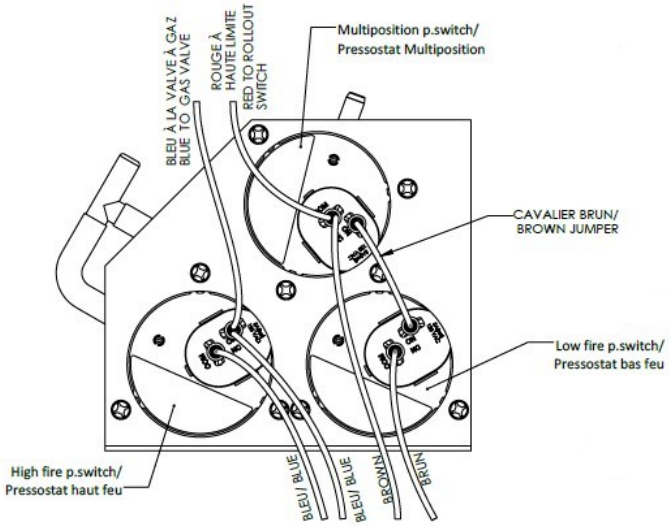
### 3.4.2 Alternate drain trap location in horizontal left position

**Figure 11 – Drain trap alternate position**




### 3.4.3 Horizontal left multiposition pressure switch connection

**Figure 12 – 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 10)

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 12 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, 6 and 10.

# 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 aiflow at the design external static pressure. 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 prescripted 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. Substract 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"w.c. - (-0.2"w.c.) = 0.5"w.c.

If the total external static pressure exceeds the maximum listed on the furnace rating plate, check for closed dampers, register, unproperly 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. See tables 29, 30 and 31 for the part number corresponding to your furnace.

### 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 attachement 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 warnigns exactly could result in serious injury, death or property damage. 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. A fire or explosion may result causing property damage, personal injury or loss of life.**

Gas piping must be installed in accordance with national and local codes. Refer to current edition of NFGC in the U.S.A.
Refer to current edition of CAN/CSA B149.1 in Canada.
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.
Report 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 equipment shut off valve MUST be installed external to furnace casing.
Install a sediment trap in riser leading to furnace as shown in Figure 16 Typical gas pipe arrangement. Connect a capped nipple into lower end of tee. 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.
Piping should be pressure and leak tested in accordance with the current edition of the NFGC in the United States, local, and national plumbing and gas codes before the furnace has been connected. Refer to current edition of NSCNGPIC in Canada.
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 test gauge connexion providing test pressure.

## 5.2 PROPANE CONVERSION

To convert from natural to L.P. gas, installer should use the appropriate conversion kit. Please refer to parts lists in this manual.
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.

## 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. Install the grommet in the hole, then insert the gas pipe.

## 5.4 SETTING GAS OUTLET PRESSURE

**NOTE : These furnace are high altitude certified, elevations under 4500 ft doesn't require orifice change.**

### 5.4.1 Adjusting 2 stage gas valve

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

1. Turn off all electrical power to the system.
2. Back outlet pressure test screw out one turn counterclockwise. (See outlet pressure boss on figure 14)
3. Attach a hose and manometer to the oulet pressure boss of the valve.
4. Turn on system power and make a call for first stage heat on the thermostat.
5. Remove both regulator cover screw and adjust low fire regulator (see figure 14 and figure 15). Adjust screw clockwise to increase pressure or counterclockwise to decrease pressure. Always adjust regulator to provide the correct pressure, as mentionned on rating plate **(approx. 1.55 in w.c.)**.
6. Turn on system power and make a call for second stage heat on the thermostat.
7. Turn high fire regulator adjust screw (see figure 14) clockwise to increase pressure or counterclockwise to decrease pressure. Always adjust regulator to provide the correct pressure, as mentionned on rating plate **(approx. 3.0 in w.c.)**.
8. Replace regulators cover screws and tighten securely.
9. Turn off all electrical power to the system.
10. Remove manometer hose from outlet pressure boss.
11. Turn outlet pressure test screw in to seal pressure port (clockwise, 7in-lb minimum)
12. Turn on 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.

### 5.4.2 Adjusting single stage gas valve

To make sure the furnace operates to the correct input, follow those steps to properly adjust the outlet gas pressure:

1. Turn off all electrical power to the system.
2. Back outlet pressure test screw out one turn counterclockwise.(See outlet pressure boss on figure 13)
3. Attach a hose and manometer to the oulet pressure boss of the valve.
4. Turn on system power and make a call for heat on the thermostat.
5. Remove regulator cover screw and turn regulator adjust screw clockwise to increase pressure or counterclockwise to decrease pressure. (see figure 13 and figure 15) Always adjust regulator to provide the correct pressure, as mentionned on rating plate **(approx. 3.0 in w.c.)**.
6. Replace regulator cover screw and tighten securely.
7. Turn off all electrical power to the system.
8. Remove manometer hose from outlet pressure boss.
9. Turn outlet pressure test screw in to seal pressure port (clockwise, 7in-lb minimum)
10. Turn on electrical power to the system.
11. Turn on system power and make a call for heat on the thermostat.
12. 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 13 – Single stage gas valve**

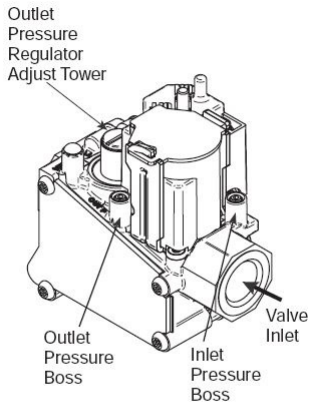


**Figure 14 – Two stage gas valve**

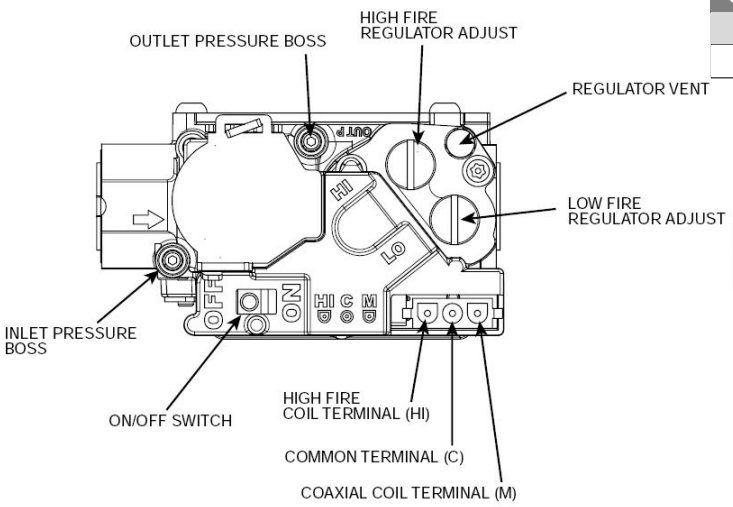



**Figure 15 – Adjustment screw**

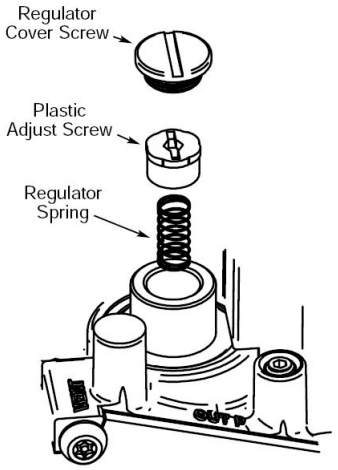



**Table 4 – Inlet gas pressure**

| Gas Pressure in w.c. (psig) | Natural gas | Propane |
|---|---|---|
| Maximum | 10.5 (0.38) | 13.0 (0.47) |
| Minimum | 4.5 (0.16) | 11.0 (0.40) |

**Table 5 – Outlet gas pressure**

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

**Figure 16 – Typical gas pipe arrangement**

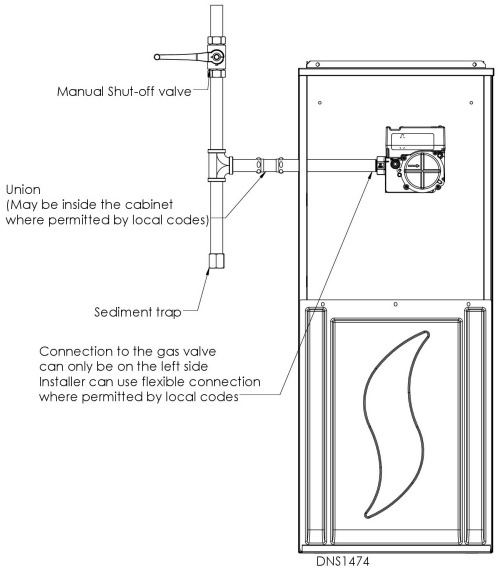



**Table 6 – Maximum capacity of pipe Cu.ft./Hr for pipe length ft (m)**

| 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 (158) | 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 |

# 6 ELECTRICAL CONNECTIONS

**⚠ WARNING**

**FIRE HAZARD**
**Failure to follow this warning could result in personal injury, death, or property damage.**
**Do not connect aluminium wire between disconnect switch and furnace. Use only copper wire.**

Check all factory and field electrical connections for tightness.
Supplied field wiring shall conform to the limitations of 63°F (33°C) rise.

## 6.1 120V WIRING

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, control LED status indicator light will flash rapidly and furnace will NOT operate.
Verify that the voltage, frequency, and phase correspond to that specified on unit rating plate. Also, check to be sure that service provided by utility is sufficient to handle load imposed by this equipment. Refer to rating plate or Table 27 for equipment electrical specifications.
**U.S.A. Installations:**
Make all electrical connections in accordance with the current edition of the National Electrical Code (NEC) ANSI/NFPA 70 and any local codes or ordinances that might apply.
**Canada Installations:**
Make all electrical connections in accordance with the current edition of the Canadian Electrical Code CSA C22.1 and any local codes or ordinances that might apply.
Use a separate, fused branch electrical circuit with a properly sized fuse or circuit breaker for this furnace. See Table 27 for fuse specifications. A readily accessible means of electrical disconnect must be located within sight of the furnace.

## 6.2 24V WIRING

Make field 24 V connections at the 24 V terminal strip. Connect terminal Y/Y2 for proper cooling operation. Use only AWG No. 18, color-coded, copper thermostat wire.
Use AWG No. 18 color coded copper thermostat wire for lengths up to 100ft. (30.5m). 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. Any direct shorts during installation, service, or maintenance could cause this fuse to blow. If fuse replacement is required, use ONLY a 3 amp.

## 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.

## 6.5 ELECTRIC DIAGRAMS

For CXX-1-D models, refer to figure 32.

For CXX-2-D models, refer to figure 33.

For CXX-1-X models, refer to figure 34.

## 6.6 ALTERNATE POWER SUPPLY

Dettson doesn't recommend to operate the furnace on a generator or other alternate power supply. 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, regardeless 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 28 and local codes.

## 7.2 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 combution.

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

Penetration throught 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.

## 7.3 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.

## 7.4 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.

## 7.5 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 7

**Table 7 – 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.

## 7.6 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 8 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 9.

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 9). Record the equivalent length of all the elbows for each pipe.

4. Record the equivalent length of the termination used (see table 9 ).

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 8 – Maximum equivalent vent length (ft) for 2-stage unit and altitude up to 4500 ft**

| Unit size | Vent pipe dia. | |
|---|---|---|
| BTU/hr | 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 9 – Deduction for fittings**

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

## 7.7 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 27)

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 throught 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 22 to 26 for allowed termination.
17. Use appropriate methods to seal the openings where combustion air pipe and vent pipe pass through roof or sidewall.

## 7.8 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 18 and 19.

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 17). 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 moiture trap should be added to the combustion air pipe as shown in figure 17.

**Figure 17 – Combustion air moisture trap**

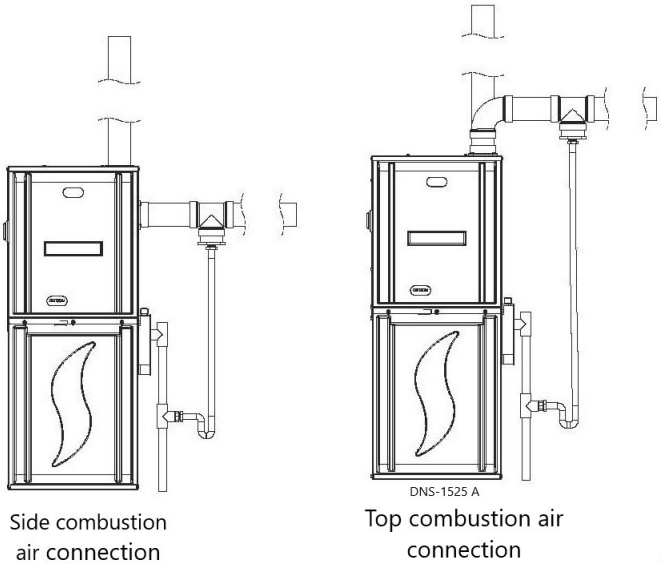



**Figure 18 – Top panel combustion air**

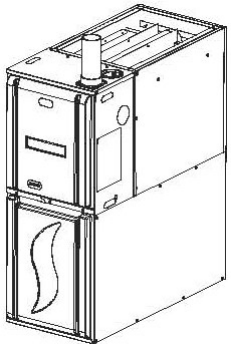
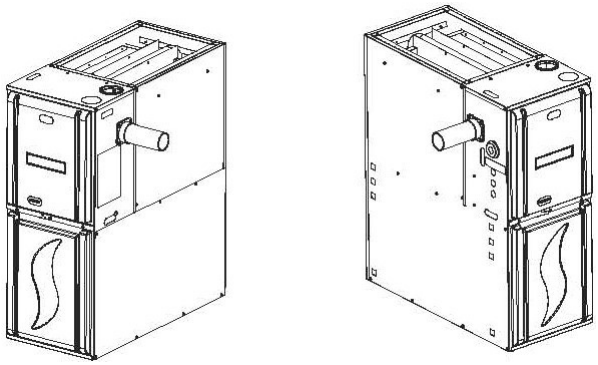


**Figure 19 – side panel combustion air**



## 7.9 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 28 and 29 for venting clearance.

### 7.9.1 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 20 and 21 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.

**Figure 20 – Roof concentric termination**

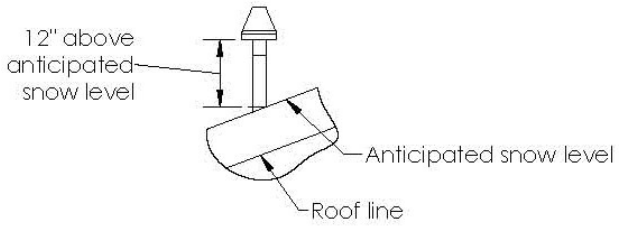
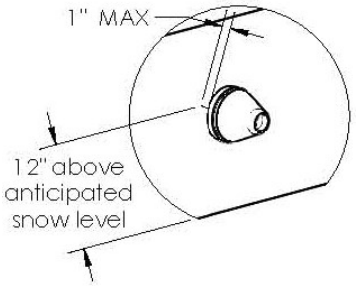



**Figure 21 – Sidewall concentric termination**




## 7.9.2 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 22 – Roof termination**

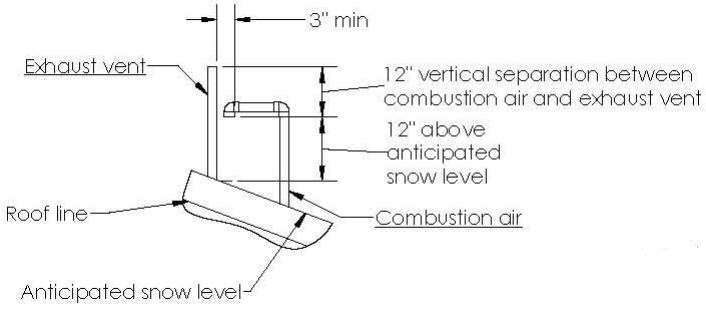



**Figure 23 – Standard horizontal termination**

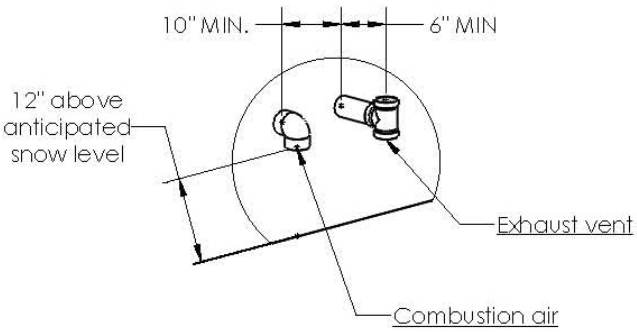



**Figure 24 – Alternate horizontal termination A**

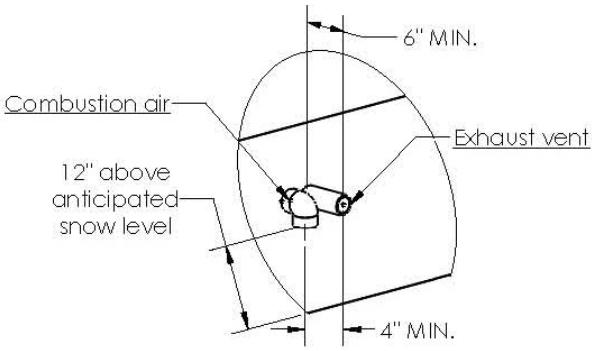



**Figure 25 – Alternate horizontal termination B**

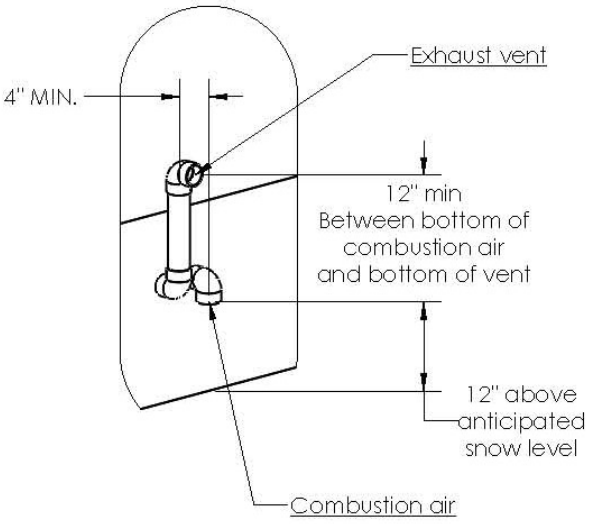


**Figure 26 – Alternate horizontal termination C**

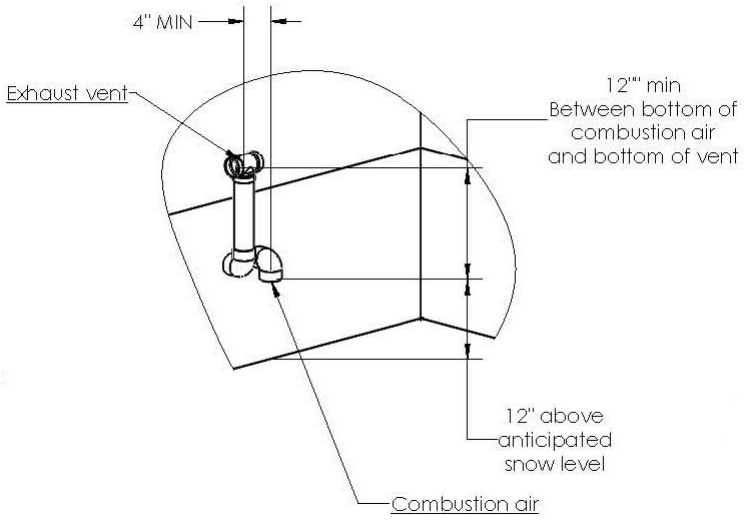



**Figure 27 – Venting gasket**

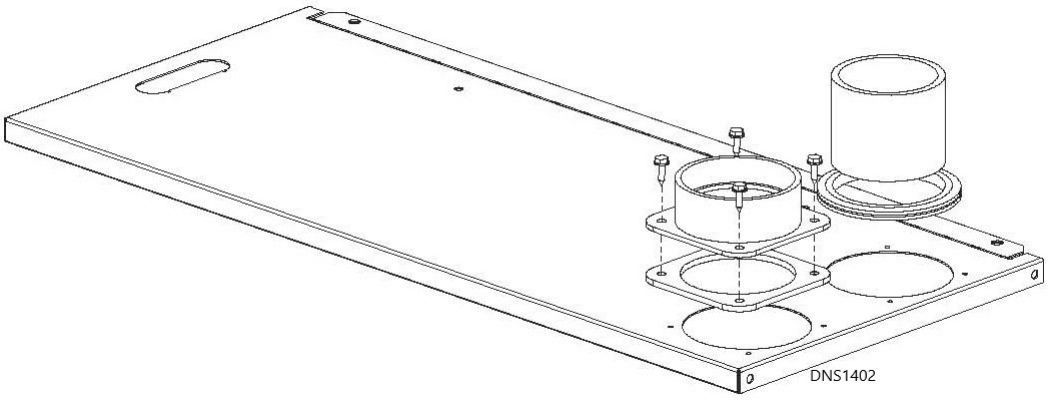
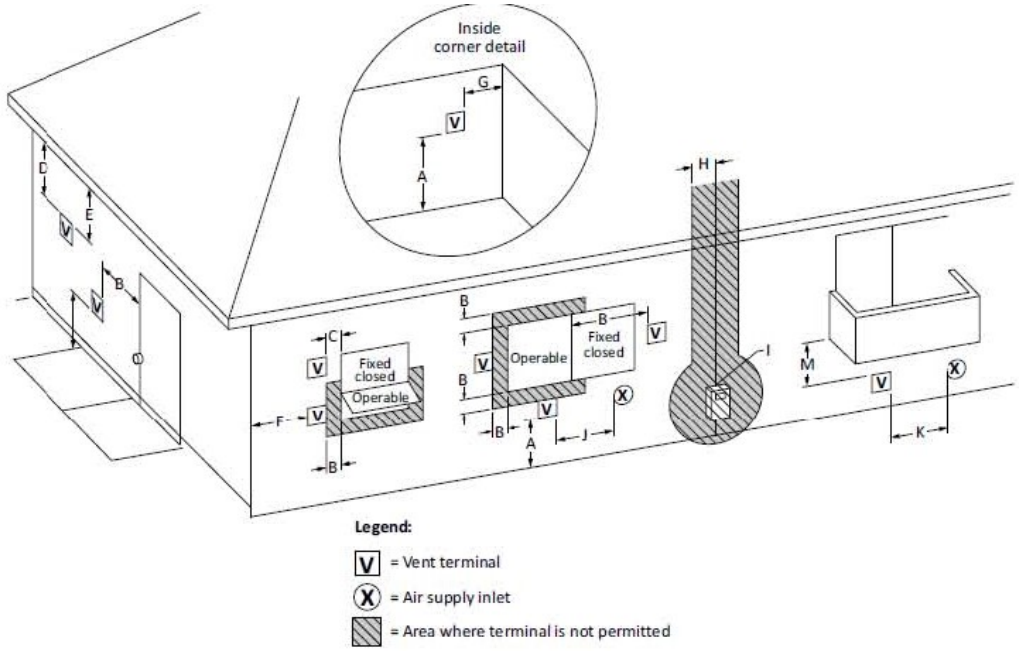


**Figure 28 – Direct vent clearance**




| | | 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)' | 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)" | Clearance in accordance with local installation codes and the requirements of the gas supplier and this manual. |

Notes :

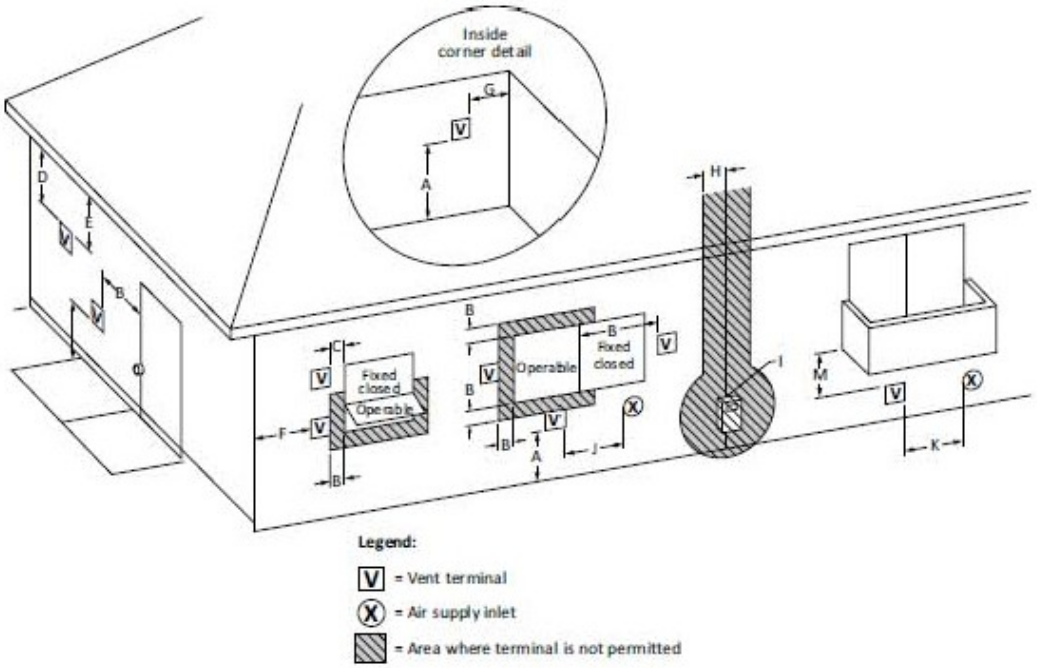
1) In accordance with the current CSA B149.1, Natural Gas and Propane Installation code

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 29 – Other than 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 > 100,000 BTUh (30 kW) | 4 feet (1.2 m) below or to side of openings; 1 foot (300 m ) 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 m ) 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 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.

# 8 START UP, ADJUSTMENT AND SAFETY CHECK

1. Furnace must have a 120 V power supply properly connected and grounded (NOTE: Proper polarity must be maintained for 120 V wiring. Control status indicator light flashes rapidly and furnace does not operate if polarity is incorrect.)

2. Thermostat wire connections at terminals R, W/W1, G, Y/Y2, etc. must be made at 24 V terminal block on furnace control

3. Natural gas service pressure must not exceed 0.38 psig (10.5 in. w.c.), but must be no less than 0.16 psig (4.5-in. w.c.). Propane service pressure must dot exceed 0.47 psig (13 in. w.c.) but must be no less than 0.40 psig (11 in. w.c.) Refer to table 4 or furnace rating plate.

4. Blower door must be in place to complete 120 V electrical circuit to furnace.

## 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 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 initial firing.
The furnace has negative pressure switch that is a safety during a call for heat. The induced draft blower must pull a negative pressure on the heat exchanger to close the negative pressure switch. The induced draft blower must maintain at least the negative pressure switch set point for the furnace to operate. If the induced draft blower fails to close or maintain the closing of the negative pressure switch, an error code would result.
Follow those step to properly start the furnace:

1. Remove the burner compartment control access door.

2. **IMPORTANT** Be sure that the manual gas control has been in the «off» position for at least five minutes. Do no attemps to manually light the main burners.

3. Set the thermostat to it lowest setting and turn off furnace electrical power.

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 at least 10°F above room temperature.

8. After the burner are lit, set the room thermostat to desired temperature.

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

# 9 SINGLE STAGE X13 MOTOR ECM

Furnaces with model number CXX-1-X are equipped with a fixed torque ECM motor. This motor provides ease in adjusting the blower speeds in cooling or heating mode. Blowers should be adjusted by the installer to match the installation requirements so as to provide the correct heating temperature rise and cooling load.

## 9.1 Selecting blower speed

To adjust the circulator blower speed, proceed as follow:

1. Turn off the power to the furnace

2. Select the heating and cooling blower speeds that match the installation requirements from the tables below.

3. Relocate the desired motor leads to the desired torque tap on the motor. The red wire locate the heating speed and the blue wire locate de cooling speed. Refer to tables 10 to 14 for tap details.

4. If heating and cooling speeds use the same speed, a jumper wire must be used between the heat and cool terminal on the motor.

5. Turn on power to the furnace.

6. Verify proper temperature rise. Excessive temperature rise can cause limit switch tripping.

**Figure 30 – X13 motor connections**

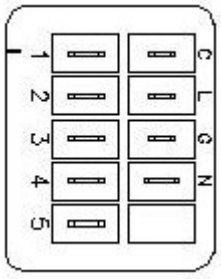



**Table 10 – CFM C45-1-X**

| TAP | TORQUE | CFM | DESCRIPTION |
|---|---|---|---|
| 5 | 100 | 1210 | 3 T. |
| 4 | 72 | 1015 | 2.5 T. |
| 3 | 50 | 780 | dT=55°F |
| 2 | 40 | 610 | 1.5 T. |
| 1 | 33 | 490 | CONSTANT CIRC. |

**Table 11 – CFM C60-1-X**

| TAP | TORQUE | CFM | DESCRIPTION |
|---|---|---|---|
| 5 | 100 | 1350 | 3.5 T. |
| 4 | 85 | 1200 | 3 T. |
| 3 | 75 | 1090 | dT=55°F |
| 2 | 50 | 830 | 2 T. |
| 1 | 35 | 560 | CONSTANT CIRC. |

**Table 12 – CFM C75-1-X**

| TAP | TORQUE | CFM | DESCRIPTION |
|---|---|---|---|
| 5 | 100 | 1545 | 4 T. |
| 4 | 85 | 1440 | 3.5 T. |
| 3 | 70 | 1265 | dT=55°F |
| 2 | 37 | 810 | 2 T. |
| 1 | 25 | 560 | CONSTANT CIRC. |

**Table 13 – CFM C105-1-X**

| TAP | TORQUE | CFM | DESCRIPTION |
|---|---|---|---|
| 5 | 95 | 1800 | 4.5 T. |
| 4 | 87 | 1735 | dT=55°F |
| 3 | 78 | 1600 | 4 T. |
| 2 | 63 | 1400 | 3.5 T. |
| 1 | 30 | 800 | CONSTANT CIRC. |

**Table 14 – CFM C120-1-X**

| TAP | TORQUE | CFM | DESCRIPTION |
|---|---|---|---|
| 5 | 100 | 1910 | dT=55°F |
| 4 | 92 | 1797 | 4.5 T. |
| 3 | 73 | 1601 | 4 T. |
| 2 | 60 | 1404 | 3.5 T. |
| 1 | 28 | 801 | CONSTANT CIRC. |

## 9.2 Dipswitch options

The option switches on the single stage furnace are used to determine the length of the cool delay-to-fan-off, heat delay-to-fan-on and heat delay-to-fan-off. Refer to tables 15 and 16 for the time period that will result from the various switch positions.

**Table 15 – Option dipswitch position single stage**

| DESCRIPTION | DIPSWITCH | ON | OFF |
|---|---|---|---|
| COOL delay-to-fan-off | S1 | 45 sec | 90 sec |
| HEAT delay-to-fan-on | S2 | 30 sec | 45 sec |

**Table 16 – Option switch single stage delay to fan off heating**

| HEAT delay | DIPSWITCH | |
|---|---|---|
| to-fan-off | S3 | S4 |
| 60 sec | ON | ON |
| 90 sec | OFF | ON |
| 120 sec | ON | OFF |
| 180 sec | OFF | OFF |

## 9.3 Cool mode

A call for cooling is initiated by closing the thermostat contacts. This energizes the control and the compressor. The optional electronic air cleaner is energized, and the circulator fan is energized at cool speed. After the thermostat is satisfied, the compressor is de-energized and the cool mode delay-to-fan-off period begins. After the delay-to-fan off period ends, the circulator fan and electronic air cleaner (optional) are de-energized.

## 9.4 Manual Fan ON mode

If the thermostat fan option is moved to the ON position, the circulator fan and optional electronic air cleaner are energized. The circulator fan speed will be energyze at the cooling speed chosen. When the fan switch is returned to the AUTO position, the circulator fan and electronic air cleaner (optional) are de-energized.

## 9.5 Twinning Interface

Twinning should not happen with an ECM motor.

## 9.6 Error codes

Refer to table 17 for a description of error codes. Please check those description before calling tech service. Anyway, the tech will ask for your error code. Each flash will last approximately 0.25 sec and each pause will last approximately 2 seconds.

**Table 17 – Error codes single stage**

| LED | Desription |
|---|---|
| 1 flash, pause | System Lockout |
| 2 flash, pause | Pressure switch stuck close |
| 3 flash, pause | Pressure switch stuck open |
| 4 flash, pause | Open limit switch |
| 5 flash, pause | Open rollout switch |
| 6 flash, pause | 115VAC polarity |
| 7 flash, pause | Low flame sense |
| continuous flashing | Flame has been sensed when no flame should be present |

# 10 SINGLE STAGE PSC MOTOR

Furnaces with model number CXX-1-D are equipped with a fixed speed motor. This motor provides ease in adjusting the blower speeds in cooling or heating mode. Blowers should be adjusted by the installer to match the installation requirements so as to provide the correct heating temperature rise and cooling load.

## 10.1 Selecting the blower speed on PSC motor

These blower speeds are set for a temperature rise of 55°F at normal static pressure. Blowers should be adjusted by the installer to match the installation requirements so as to provide the correct heating temperature rise and cooling load. To adjust the circulator blower speed, proceed as follow:

1. Turn off the power to the furnace
2. Select the heating and cooling blower speeds that match the installation requirements.
3. Relocate the desired motor leads to the desired speed on the motor. The red wire locate the heating speed and the blue wire locate de cooling speed.
4. If heating and cooling speeds are the same, a jumper wire must be used between the heat and cool terminal on the control board. The unused leads must be connected to the “PARK” terminal on the control board.
5. Turn on power to the furnace.
6. Verify proper temperature rise. Excessive temperature can cause limit switch tripping.

**Figure 31 – PSC motor connections**

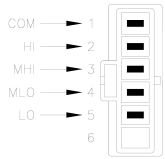



**Table 18 – Suggested heating fan speed on single stage furnace**

| INPUT BTU/hr | SPEED |
|---|---|
| 45 000 | LOW |
| 60 000 | MED-LOW |
| 75 000 | MED-LOW |
| 105 000 | HIGH |
| 120 000 | HIGH |

**Table 19 – CFM C45-1-D/C45-2-D**

| MOTOR SPEED | Static pressure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| HIGH | 1120 | 1095 | 1045 | 1020 | 970 | 915 | 845 | 780 | 710 | 640 |
| MED-HIGH | 1047 | 1045 | 980 | 940 | 880 | 835 | 775 | 715 | 665 | 585 |
| MED | 935 | 950 | 910 | 865 | 820 | 780 | 730 | 670 | 600 | 565 |
| LOW | 930 | 925 | 875 | 835 | 800 | 760 | 710 | 660 | 605 | 545 |

**Table 20 – CFM C60-1-D/C60-2-D**

| MOTOR SPEED | Static pressure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| HIGH | 1374 | 1372 | 1370 | 1305 | 1230 | 1155 | 1085 | 1005 | 945 | 860 |
| MED-HIGH | 1198 | 1195 | 1134 | 1085 | 1025 | 975 | 925 | 875 | 814 | 740 |
| MED | 1155 | 1150 | 1100 | 1050 | 1000 | 955 | 905 | 860 | 795 | 725 |
| LOW | 1026 | 1005 | 980 | 945 | 905 | 865 | 820 | 780 | 720 | 655 |

**Table 21 – CFM C75-1-D/C75-2-D**

| MOTOR SPEED | Static pressure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| HIGH | 1617 | 1615 | 1540 | 1440 | 1355 | 1280 | 1204 | 1182 | 1060 | 980 |
| MED-HIGH | 1675 | 1670 | 1590 | 1480 | 1382 | 1300 | 1219 | 1192 | 1065 | 982 |
| MED | 1500 | 1496 | 1388 | 1289 | 1188 | 1133 | 1087 | 1083 | 1015 | 975 |
| LOW | 1272 | 1197 | 1148 | 1108 | 1042 | 967 | 913 | 824 | 777 | 749 |

**Table 22 – CFM C105-1-D/C105-2-D**

| MOTOR SPEED | Static pressure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| HIGH | 1748 | 1740 | 1615 | 1515 | 1430 | 1355 | 1285 | 1195 | 1110 | 1030 |
| MED-HIGH | 1700 | 1655 | 1550 | 1435 | 1360 | 1285 | 1230 | 1150 | 1080 | 990 |
| MED | 1415 | 1405 | 1325 | 1240 | 1180 | 1135 | 1070 | 1005 | 930 | 845 |
| LOW | 1165 | 1130 | 1065 | 1025 | 975 | 935 | 870 | 830 | 775 | 705 |

**Table 23 – CFM C120-1-D/C120-2-D**

| MOTOR SPEED | Static pressure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| HIGH | 1917 | 1915 | 1910 | 1830 | 1750 | 1675 | 1600 | 1520 | 1440 | 1350 |
| MED-HIGH | 1893 | 1890 | 1885 | 1800 | 1735 | 1670 | 1600 | 1520 | 1430 | 1350 |
| MED | 1746 | 1745 | 1675 | 1605 | 1540 | 1470 | 1390 | 1335 | 1275 | 1210 |
| LOW | 1608 | 1600 | 1555 | 1500 | 1445 | 1390 | 1350 | 1310 | 1250 | 1210 |

## 10.2 Dipswitch options

Please refer to section 9.2.

## 10.3 Cool mode

Please refer to section 9.3.

## 10.4 Manual fan ON mode

Please refer to section 9.4.

## 10.5 Twinning Interface

Twinning furnaces is NOT recommended.

## 10.6 Error codes

Please refer to section 9.6 and table 17.

# 11 2 STAGE PSC MOTOR

## 11.1 Selecting the blower speed

Furnaces with model number CXX-2-D are equipped with a multi-speed circulator blower. This blower provides ease in adjusting blower speeds. The heating blower speed are shipped with the suggested fan speed describe in Table 24. These blower speeds are set for a temperature rise of 55°F at normal static pressure. Blowers should be adjusted by the installer to match the installation requirements so as to provide the correct heating temperature rise and cooling load. To adjust the circulator blower speed, proceed as follow:

1. Turn off the power to the furnace
2. Select the heating and cooling blower speeds that match the installation requirements from the airflow tables in annexe.
3. Relocate the desired motor leads to the desire speed on the motor. The red wire locate the 2nd stage heating speed, the black wire locate the 1st stage heating and the blue wire locate de cooling speed.
4. If heating and cooling speeds are the same, a jumper wire must be used between the heat and cool terminal on the control board. The unused leads must be connected to the “PARK” terminal on the control board.
5. Turn on power to the furnace.
6. Verify proper temperature rise. Excessive temperature rise can cause limit switch tripping.

**Table 24 – Suggested heating fan speed on 2 stage furnace**

| INPUT BTU/hr | HEATING 1ST STAGE | HEATING 2ND STAGE |
|---|---|---|
| 45 000 | LOW | MED-LOW |
| 60 000 | LOW | MED-LOW |
| 75 000 | LOW | MED-LOW |
| 105 000 | LOW | MED-HIGH |
| 120 000 | MED-LOW | HIGH |

## 11.2 Dipswitch options

Dipswitches are used to determine :

1. Delay-to-fan-off periods. Refer to table 25
2. Second stage delay when using a single stage thermostat. Refer to table 26

**Table 25 – Heat delay-to-fan-off**

| DELAY | S1-3 | S1-4 |
|---|---|---|
| 90 sec | OFF | OFF |
| 120 sec | OFF | ON |
| 150 sec | ON | OFF |
| 180 sec | ON | ON |

**Table 26 – 2nd stage delay for single stage thermostat**

| DELAY | S1-1 | S1-2 |
|---|---|---|
| OFF | OFF | OFF |
| 10 min | ON | OFF |
| Auto | OFF | ON |
| 20 min | ON | ON |

## 11.3 Cool mode

In a typical single stage cooling system (Y connection), a call for cool is initiated by closing the thermostat contacts. This energizes the compressor and the electronic air cleaner (optional).
The circulator will be energized at cool speed after the COOL delay-to-fan-on period. After the thermostat is satisfied, the compressor is de-energized and the COOL delay-to-fan-off period begins. After the COOL delay-to-fan-off period ends, the circulator and the electronic air cleaner are de-energized.

## 11.4 Manual fan ON mode

If the thermostat fan switch is moved to the ON position, the circulator fan (low heat speed) and the electronic air

cleaner (optional) are energized. When the fan switch is returned to the AUTO position, the circulator and electronic air cleaner are de-energized.

## 11.5 Error codes

For a list a error codes and the diagnostic please refer to table 28

# 12 SAFETY CHECK

## 12.1 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 ONLY be primed by pouring water into the side or top drain inlet of condensate trap.

## 12.2 Furnace operating conditions

Be sure to fill section 15 : Furnace info. By doing so, you will make sure the furnace operates in the best conditions : temperature rise, gas inlet and outlet pressure, duct static pressure, vent length, etc.

## 12.3 Checklist

1. Make sure you filled section 15 Furnace Info.
2. Put away tools and instruments. Clean up debris.
3. Verify that blower and control doors are properly installed.
4. Cycle test furnace with room thermostat.
5. Check operation of accessories.
6. Review manual with homeowner.
7. Attach litterature to furnace.

# 13 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 furnace area for gas. Be sure to smell near floor because some gas is heavier than air and will settle to the lowest point. See WHAT TO DO IF YOU SMELL GAS 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.

## 13.1 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 gry 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.**

## 13.2 SHUTTING DOWN THE FURNACE

To shut down the furnace, set the thermostat to the "OFF" position.

### 13.2.1 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.

# 14 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 also other service and maintenance procedures that require the skills of a service person that has 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 at 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
- Coatings
- Corrosion

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

## 14.1 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 filter and/or use a vacuum cleaner. Wash filter in soap or detergent water and replace after filter is dry.

Cleanable filters do not need to be oiled after washing. Cleanable filters may be replaced with disposable filters. If your air distribution system has a central return air filter-grille, the furnace does not need a filter. Filter-grilles can be maintained the same way as cleanable filters.

## 14.2 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 made 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 condensate drain line becomes blocked or plugged. If this event occurs, have the furnace inspected by a qualified service technician.

## 14.3 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.

## 14.4 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.

**Table 27 – Electrical data**

| Single Stage X13 motor | | | | | | |
|---|---|---|---|---|---|---|
| UNIT SIZE | VOLT-HERTZ-PHASE | OPERATING VOLT RANGE | | MAX UNIT AMPS | UNIT AMPACITY | BREAKER AMPS |
| | | MAX | MIN | | | |
| 45 000 | 120-60-1 | 127 | 104 | 10.2 | 11.9 | 15 |
| 60 000 | 120-60-1 | 127 | 104 | 10.2 | 11.9 | 15 |
| 75 000 | 120-60-1 | 127 | 104 | 11.4 | 13.5 | 15 |
| 105 000 | 120-60-1 | 127 | 104 | 13.9 | 16.6 | 20 |
| 120 000 | 120-60-1 | 127 | 104 | 13.9 | 16.6 | 20 |
| **Single Stage PSC motor** | | | | | | |
| UNIT SIZE | VOLT-HERTZ-PHASE | OPERATING VOLT RANGE | | MAX UNIT AMPS | UNIT AMPACITY | BREAKER AMPS |
| | | MAX | MIN | | | |
| 45 000 | 120-60-1 | 127 | 104 | 13.4 | 15.9 | 20 |
| 60 000 | 120-60-1 | 127 | 104 | 13.4 | 15.9 | 20 |
| 75 000 | 120-60-1 | 127 | 104 | 13.1 | 15.5 | 20 |
| 105 000 | 120-60-1 | 127 | 104 | 16.4 | 19.7 | 20 |
| 120 000 | 120-60-1 | 127 | 104 | 16.4 | 19.7 | 20 |
| **Two Stage ECM motor** | | | | | | |
| UNIT SIZE | VOLT-HERTZ-PHASE | OPERATING VOLT RANGE | | MAX UNIT AMPS | UNIT AMPACITY | BREAKER AMPS |
| | | MAX | MIN | | | |
| 45 000 | 120-60-1 | 127 | 104 | 10.7 | 12.7 | 15 |
| 60 000 | 120-60-1 | 127 | 104 | 12.6 | 15 | 15 |
| 75 000 | 120-60-1 | 127 | 104 | 12.6 | 15 | 15 |
| 105 000 | 120-60-1 | 127 | 104 | 15.8 | 19 | 20 |
| 120 000 | 120-60-1 | 127 | 104 | 15.8 | 19 | 20 |
| **Two Stage PSC motor** | | | | | | |
| UNIT SIZE | VOLT-HERTZ-PHASE | OPERATING VOLT RANGE | | MAX UNIT AMPS | UNIT AMPACITY | BREAKER AMPS |
| | | MAX | MIN | | | |
| 45 000 | 120-60-1 | 127 | 104 | 12.8 | 15.3 | 20 |
| 60 000 | 120-60-1 | 127 | 104 | 12.8 | 15.3 | 20 |
| 75 000 | 120-60-1 | 127 | 104 | 12.5 | 15.0 | 15 |
| 105 000 | 120-60-1 | 127 | 104 | 15.8 | 19.1 | 20 |
| 120 000 | 120-60-1 | 127 | 104 | 15.8 | 19.1 | 20 |

**Figure 32 – Single Stage PSC Wiring diagram**

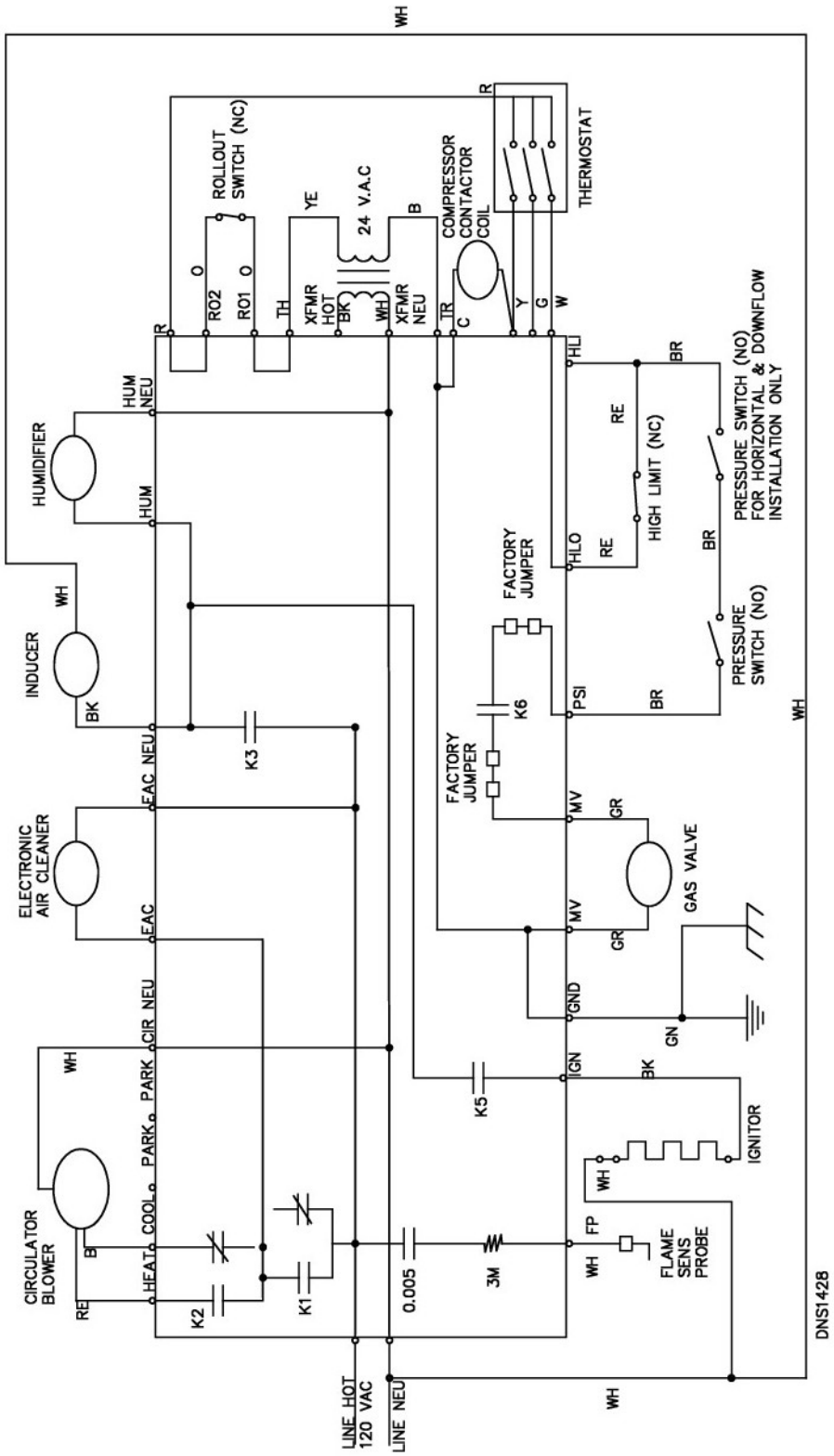


**Figure 33 – Two Stage PSC Wiring diagram**

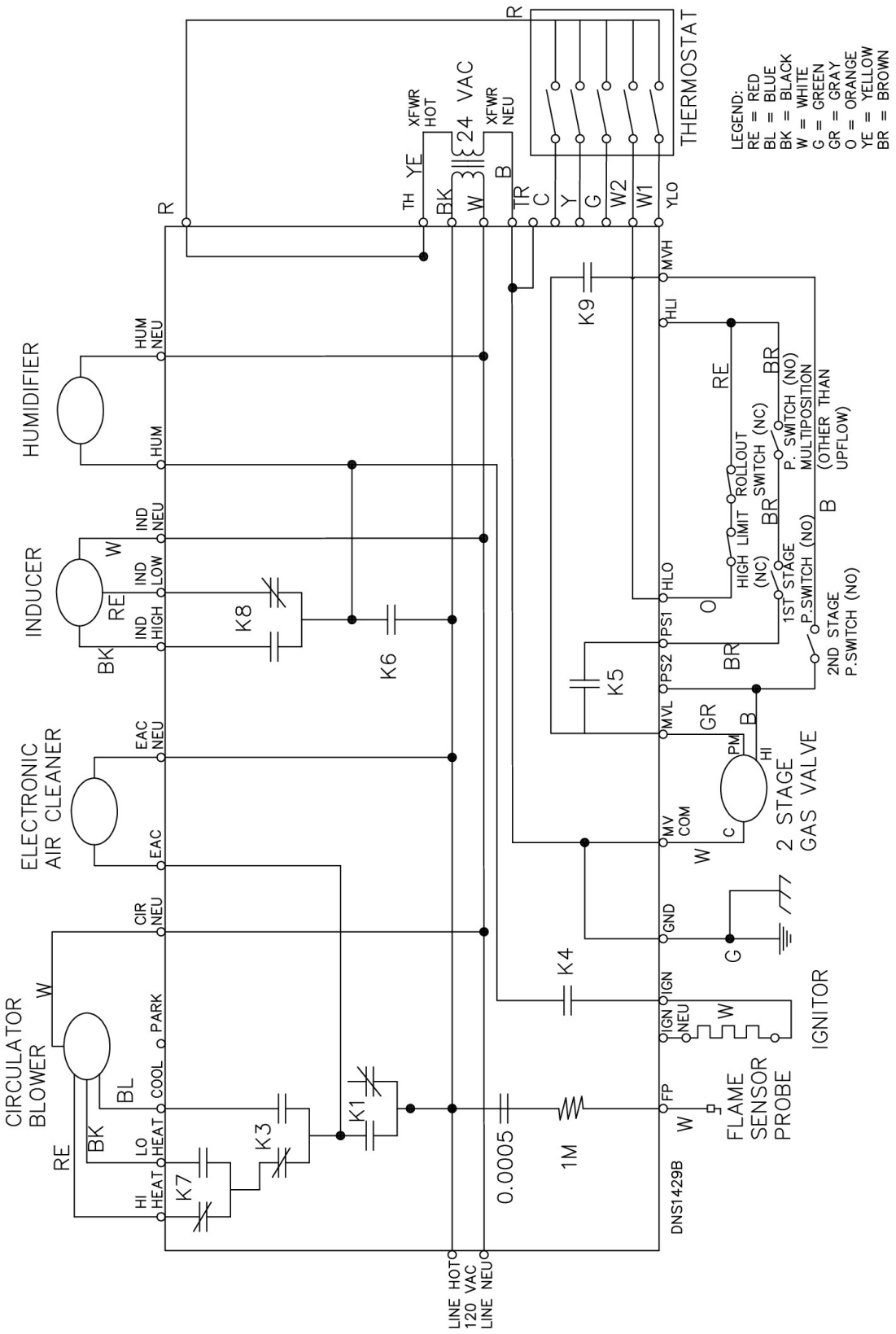
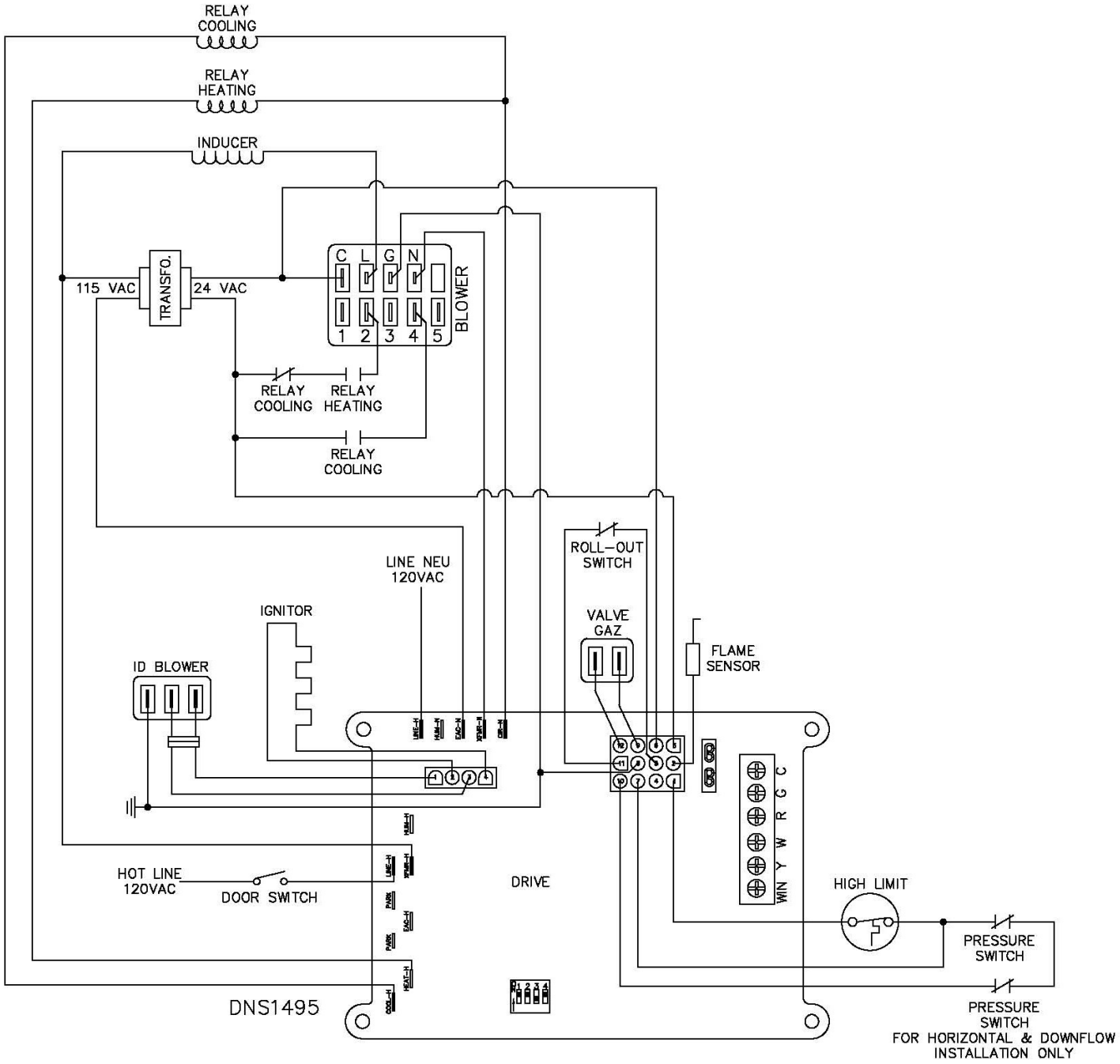


**Figure 34 – Single Stage ECM Wiring diagram**

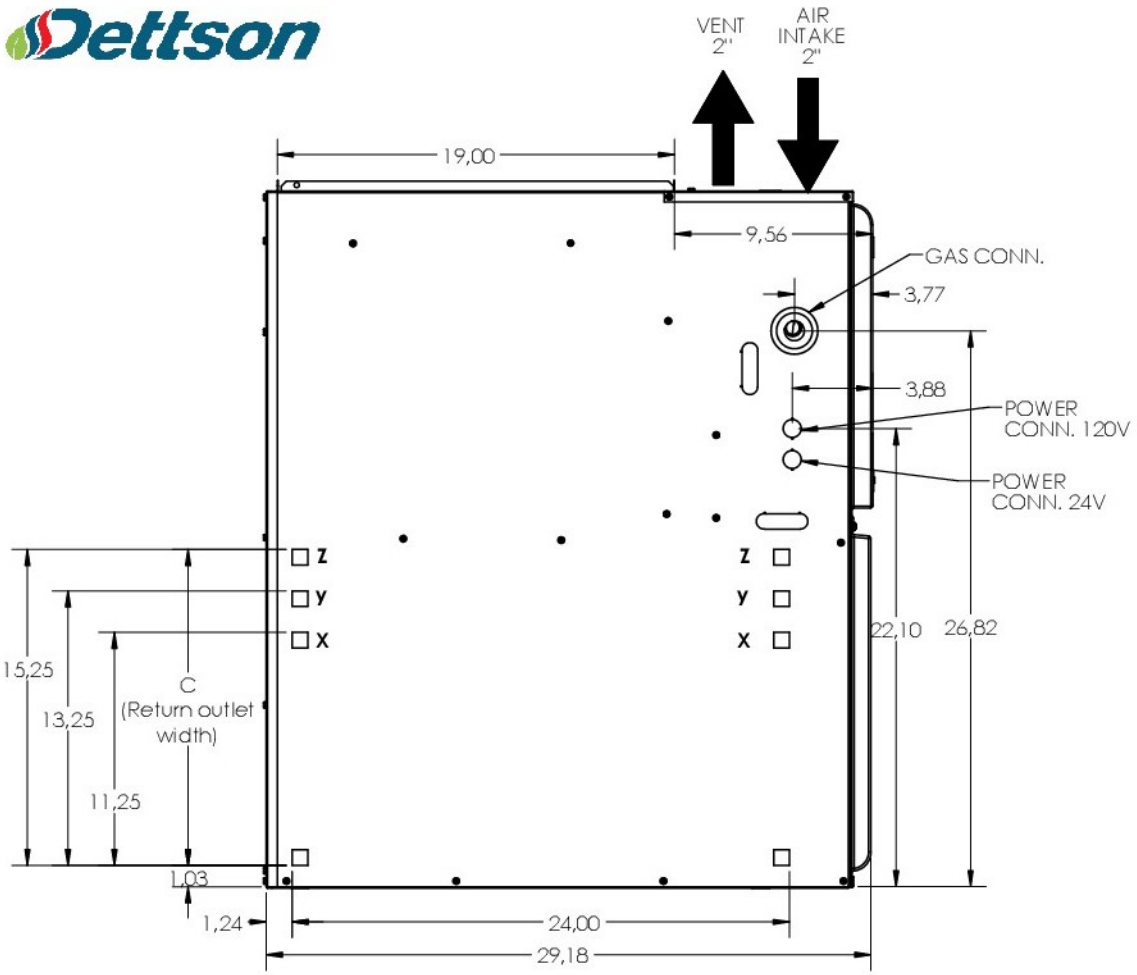


## 15 FURNACE INFO

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 28 – Error Codes 2 Stage PSC furnace

| 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 or roll out switch | Check fuse and replace. Check roll out switch |
| | | 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 | Reset the unit and verify blower is functionning 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 functionning. | Replace control board. |
| | | Solid ON | Internal control board error | Reset control. Replace control board if error code is still present. |
| | | Rapid | Twinning error (Twinning is not recommanded) | Don't twin your furnaces. |
| | | 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 functionning 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 |



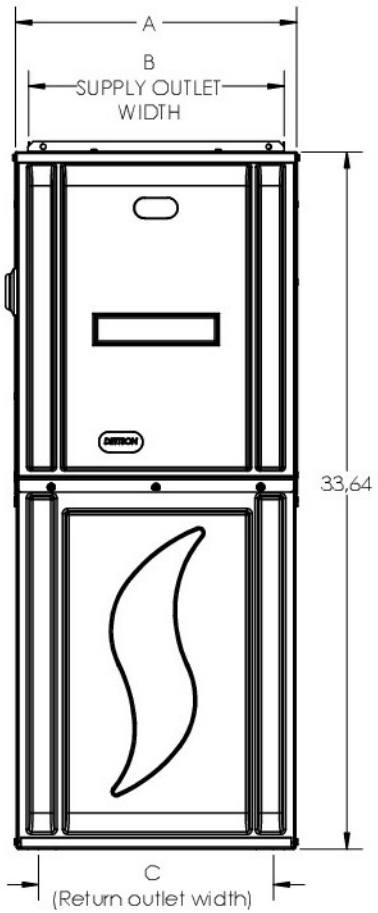




Figure 35 – Dimensions

| Furnace size | A (Cabinet width) | B (Supply outlet width) | C (Return outlet width) | Filter size |
|---|---|---|---|---|
| 15k | 13.500 | 12.500 | 11.250 | 13 x 24 |
| 30k | 13.500 | 12.500 | 11.250 | 13 x 24 |
| 45k | 13.500 | 12.500 | 11.250 | 13 x 24 |
| 60k | 15.750 | 14.750 | 13.250 | 15 x 24 |
| 75k | 15.750 | 14.750 | 13.250 | 15 x 24 |
| 90k | 21.188 | 20.000 | 15.250 | 17 x 24 |
| 105k | 21.188 | 20.000 | 15.250 | 17 x 24 |
| 120k | 21.188 | 20.000 | 15.250 | 17 x 24 |

| Air return | |
|---|---|
| Position | Furnace size |
| X | 15 @ 45 000 |
| Y | 60 @75 000 |
| Z | 90 @ 120 000 |

**Figure 36 – Exploded view CXX-1-X part 1**

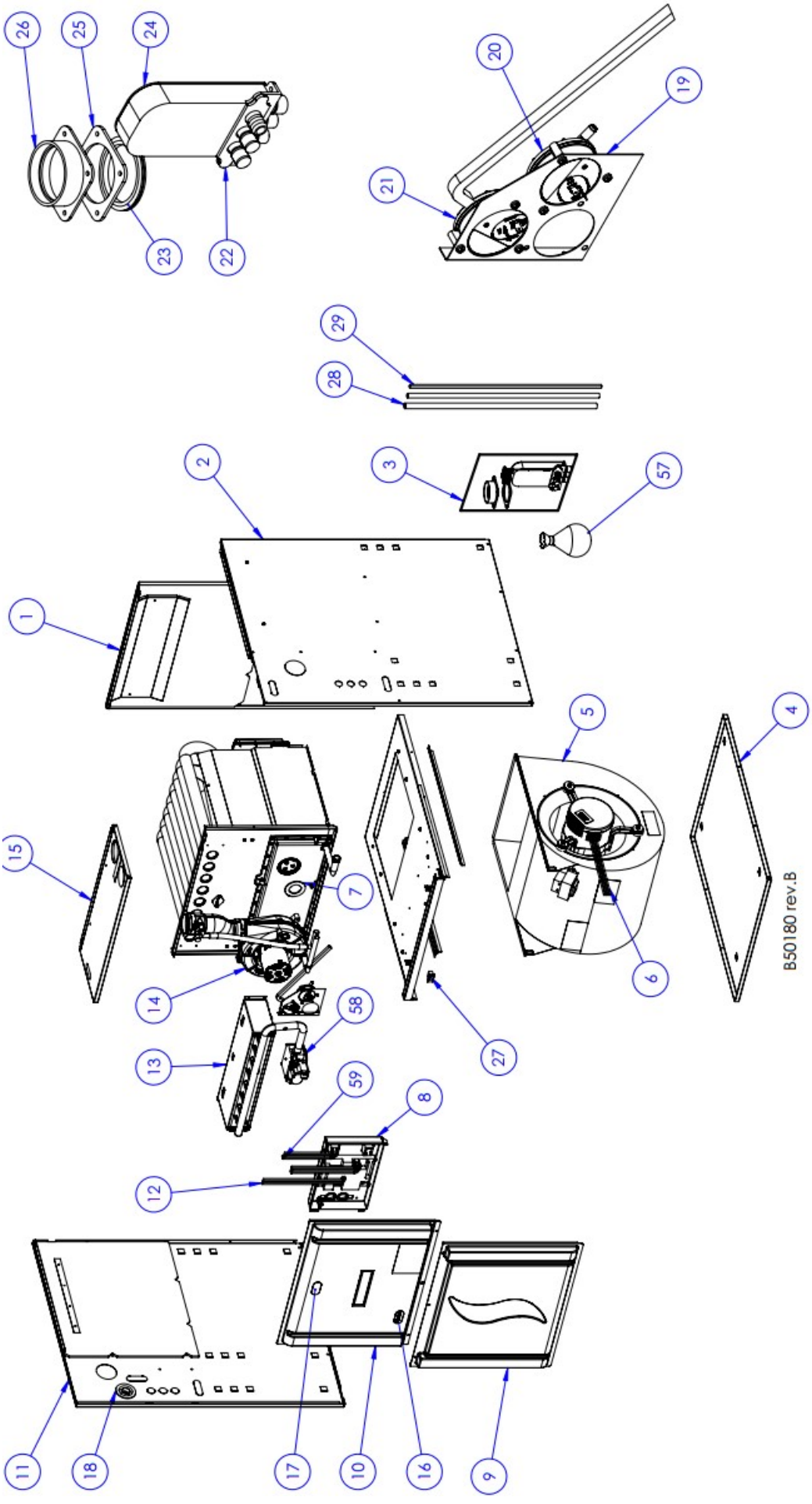
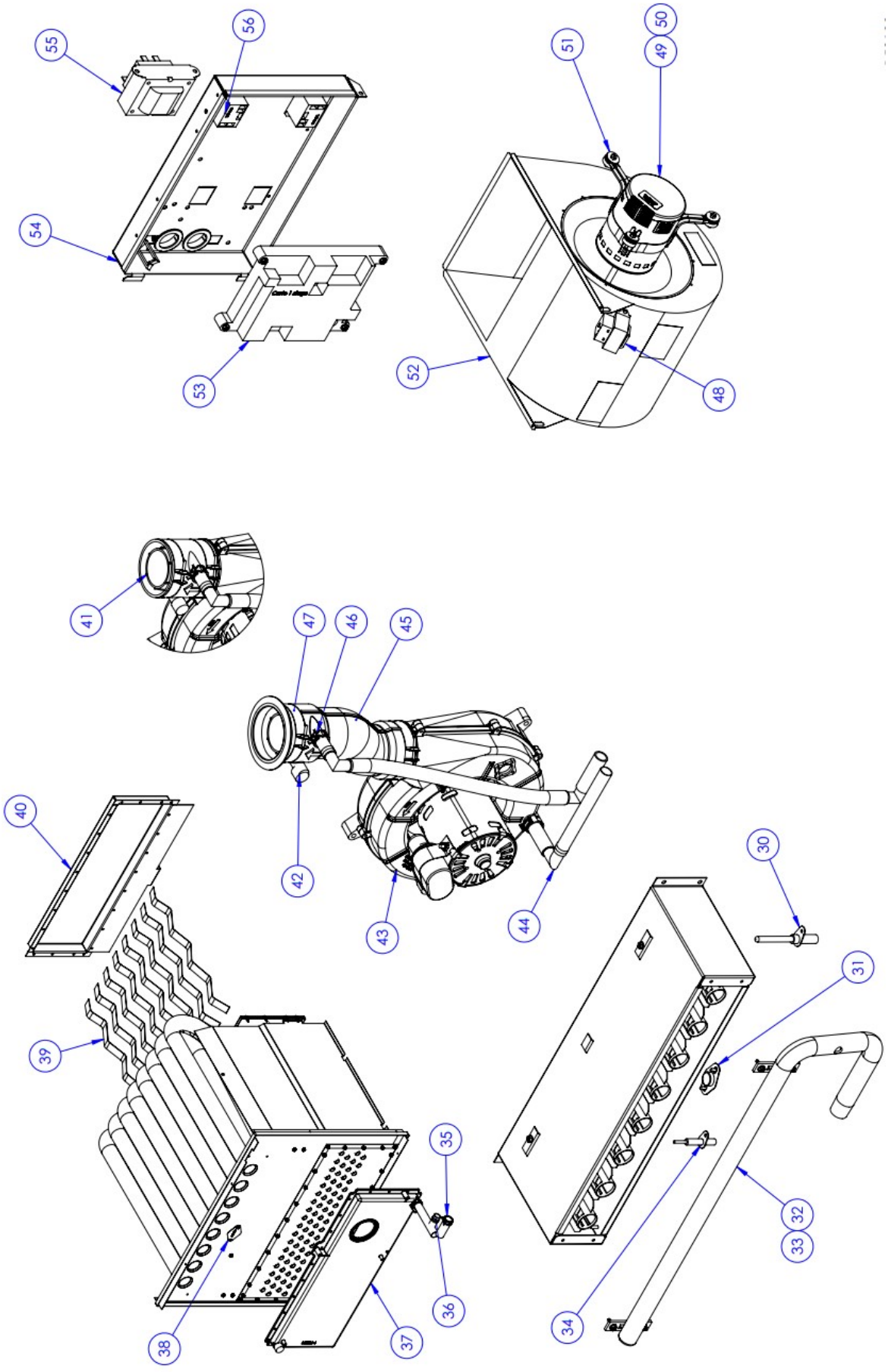


**Figure 37 – Exploded view CXX-1-X part 2**



## Table 29 – Part list single stage ECM (x13)

| # | Description | C45-1-X | C60-1-X | C75-1-X | C105-1-X | C120-1-X |
|---|---|---|---|---|---|---|
| 1 | Rear panel assembly | B40511-01 | B40511-02 | B40511-02 | B40511-03 | B40511-03 |
| 2 | Right panel assembly | B40510-33 | B40510-33 | B40510-33 | B40510-33 | B40510-33 |
| 3 | Part bag | B40569-01 | B40569-01 | B40569-01 | B40569-01 | B40569-01 |
| 4 | Floor | B40546-01 | B40546-02 | B40546-02 | B40546-03 | B40546-03 |
| 5 | Blower assembly | B40815-01 | B40815-02 | B40815-03 | B40815-05 | B40815-06 |
| 6 | Blower wire harness | B40826 | B40826 | B40826 | B40826 | B40826 |
| 7 | Restriction disk | B40699 | B40563-04 | B40698 | B40563-06 | N/A |
| 8 | Control box ass. | B40813 | B40813 | B40813 | B40813 | B40813 |
| 9 | Lower door ass. | B40570-13 | B40570-14 | B40570-14 | B40570-15 | B40570-15 |
| 10 | Upper door ass. | B40571-01 | B40571-02 | B40571-02 | B40571-03 | B40571-03 |
| 11 | Left panel ass. | B40509-01 | B40509-01 | B40509-01 | B40509-01 | B40509-01 |
| 12 | Ignitor/Inducer elect. kit | B40589-02 | B40589-02 | B40589-02 | B40589-02 | B40589-02 |
| 13 | Burner box (items 30,31,32,33,34 not included) | B40908-03 | B40908-04 | B40908-05 | B40908-07 | B40908-08 |
| 14 | Inducer blower | Z01K007K | Z01K007K | Z01K007K | Z01K007K | Z01K007K |
| 15 | Top panel ass. | B40512-01 | B40512-02 | B40512-02 | B40512-03 | B40512-03 |
| 16 | Dettson observation port | B40565 | B40565 | B40565 | B40565 | B40565 |
| 17 | Observation port | L04Z022 | L04Z022 | L04Z022 | L04Z022 | L04Z022 |
| 18 | Gas line grommet | G14F017 | G14F017 | G14F017 | G14F017 | G14F017 |
| 19 | Pressure switch bracket | B40560 | B40560 | B40560 | B40560 | B40560 |
| 20 | Multiposition pressure switch | R99F035 | R99F035 | R99F035 | R99F035 | R99F035 |
| 21 | Pressure switch | R99F043 | R99F042 | R99F048 | R99F039 | R99F039 |
| 22 | Drain trap gasket | B40568 | B40568 | B40568 | B40568 | B40568 |
| 23 | Exhaust venting gasket | B40903 | B40903 | B40903 | B40903 | B40903 |
| 24 | Drain trap | B40760 | B40760 | B40760 | B40760 | B40760 |
| 25 | Combustion air flange gasket | B40567 | B40567 | B40567 | B40567 | B40567 |
| 26 | Combustion air flange | B40533 | B40533 | B40533 | B40533 | B40533 |
| 27 | Door switch | L07H001 | L07H001 | L07H001 | L07H001 | L07H001 |
| 28 | Clear PVC tubing 5/8" (24 in) | B30157-34 | B30157-34 | B30157-34 | B30157-34 | B30157-34 |
| 28 | Clear PVC tubing 1/2" (24 in) | B30157-38 | B30157-38 | B30157-38 | B30157-38 | B30157-38 |
| 29 | Square black tubing 3/16" | B30157-26 | B30157-26 | B30157-26 | B30157-26 | B30157-26 |
| 30 | Ignitor | R03K005K | R03K005K | R03K005K | R03K005K | R03K005K |
| 31 | Roll out switch | R02N022 | R02N022 | R02N022 | R02N022 | R02N022 |
| 32 | Gas manifold (orifice included) | B40527 | B40528 | B40529 | B40531 | B40532 |
| 33 | Nat. Gas orifice # 48 | R04I001 | R04I001 | R04I001 | R04I001 | R04I001 |
| 34 | Flame rod | R03J005 | R03J005 | R03J005 | R03J005 | R03J005 |
| 35 | Hose clamp 5/8" | G99Z035 | G99Z035 | G99Z035 | G99Z035 | G99Z035 |
| 36 | Elbow 5/8" | G07J007 | G07J007 | G07J007 | G07J007 | G07J007 |
| 37 | Condensate box | B40526-01 | B40526-02 | B40526-02 | B40526-03 | B40526-04 |
| 38 | Heat exchanger thermodisk | R02N026 | R02N024 | R02N023 | R02N024 | R02N024 |
| 39 | Heat exchanger baffle | B40572 | B40572 | B40572 | B40572 | B40572 |
| 40 | Smoke box | B40539-01 | B40539-02 | B40539-02 | B40539-03 | B40539-04 |
| 41 | Rubber vent flange | B40580 | B40580 | B40580 | B40580 | B40580 |
| 42 | 1/2" black cap | G14G013 | G14G013 | G14G013 | G14G013 | G14G013 |
| 43 | ID blower assembly | B40578-04 | B40578-01 | B40578-01 | B40578-01 | B40578-01 |
| 44 | Elbow 1/2" | G07J006 | G07J006 | G07J006 | G07J006 | G07J006 |
| 45 | ID blower and elbow assembly | — | B40766-01 | B40766-01 | B40766-01 | B40766-01 |
| 46 | Hose clamp 1/2" | G99Z034 | G99Z034 | G99Z034 | G99Z034 | G99Z034 |
| 47 | Hose clamp 2-3" | G99Z033 | G99Z033 | G99Z033 | G99Z033 | G99Z033 |
| 48 | Inductor | B03141-02 | B03141-01 | B03141-01 | B03141 | B03141 |
| 49 | X13 motor assembly (include item 51) | B40814-01 | B40814-02 | B40814-03 | B40814-05 | B40814-06 |
| 50 | X13 motor (programmed) | B40806-02 | B40806-01 | B40807-01 | B40808-01 | B40808-02 |
| 51 | Belly band | B01889 | B01889 | B01889 | B01889 | B01889 |
| 52 | Blower | Z01I033 | Z01I035 | Z01I036 | Z01I038 | Z01I038 |
| 53 | Control board single stage | R99G013K | R99G013K | R99G013K | R99G013K | R99G013K |
| 54 | Control board support | B40559 | B40559 | B40559 | B40559 | B40559 |
| 55 | Transformer 120v-24v | L01F009 | L01F009 | L01F009 | L01F009 | L01F009 |
| 56 | Relay 120Vac | L01H011 | L01H011 | L01H011 | L01H011 | L01H011 |
| 57 | Extruded seal | B04435-01 | B04435-01 | B04435-01 | B04435-01 | B04435-01 |
| 58 | Gas valve single stage | R01H012 | R01H012 | R01H012 | R01H012 | R01H012 |
| 69 | Electric wires relays | B84015 | B84015 | B84015 | B84015 | B84015 |
| — | Bottom return base | B40691-01 | B40691-02 | B40691-02 | B40691-03 | B40691-03 |
| — | Downflow base | B40632-01 | B40632-02 | B40632-02 | B40632-03 | B40632-03 |
| — | Cooling coil support | B40693-01 | B40693-02 | B40693-02 | B40693-03 | B40693-03 |
| — | Propane conversion kit | B40574-07 | B40574-10 | B40574-13 | B40574-19 | B40574-22 |
| — | Orifice #56 Propane | R04I002 | R04I002 | R04I002 | R04I002 | R04I002 |

**Figure 38 – Exploded view Cxx-1-D part 1**

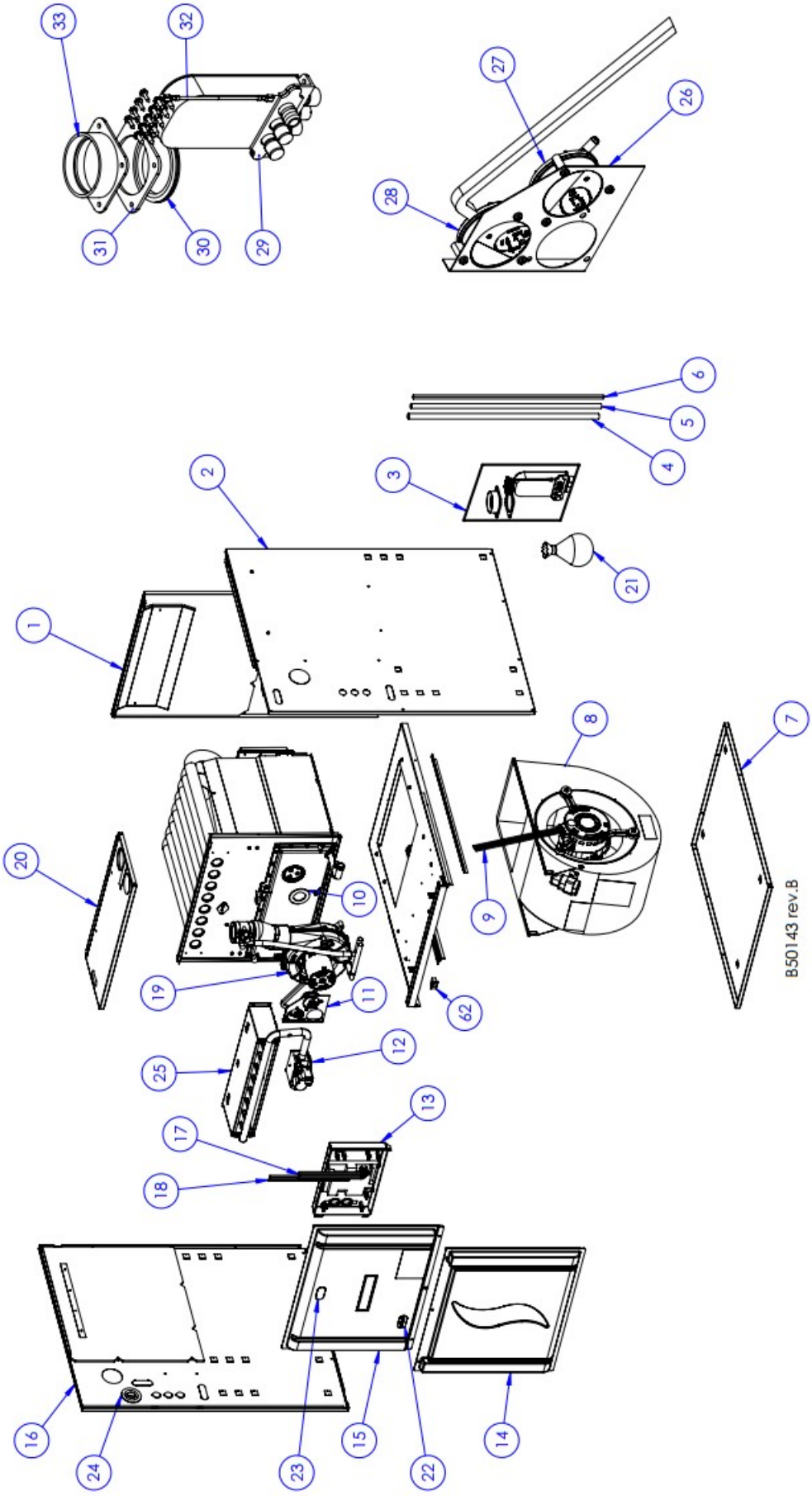
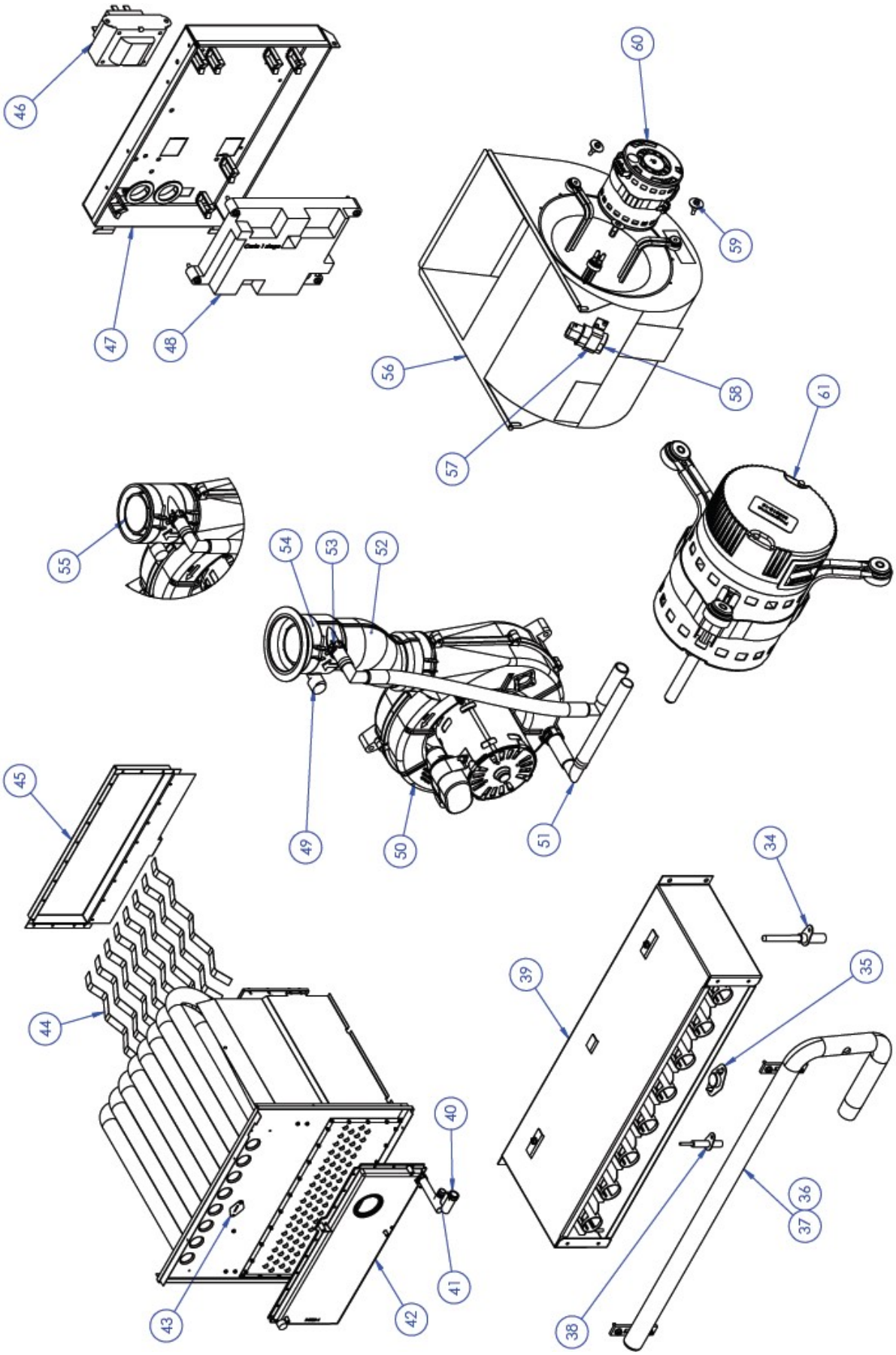


**Figure 39 – Exploded view Cxx-1-D part 2**



## Table 30 – Part list single stage PSC

| # | Description | C45-1-D | C60-1-D | C75-1-D | C105-1-D | C120-1-D |
|---|---|---|---|---|---|---|
| 1 | Back panel assembly | B40511-04 | B40511-05 | B40511-05 | B40511-06 | B40511-06 |
| 2 | Right panel assembly | B40510-34 | B40510-34 | B40510-34 | B40510-34 | B40510-34 |
| 3 | Part bag | B40569-01 | B40569-02 | B40569-02 | B40569-02 | B40569-02 |
| 4 | PVC Tube 1/2" | B30157-38 | B30157-38 | B30157-38 | B30157-38 | B30157-38 |
| 5 | PVC Tube 5/8" | B30157-34 | B30157-34 | B30157-34 | B30157-34 | B30157-34 |
| 6 | Square tube 3/16" | B30157-26 | B30157-26 | B30157-26 | B30157-26 | B30157-26 |
| 7 | Floor | B40546-01 | B40546-02 | B40546-02 | B40546-03 | B40546-03 |
| 8 | Blower assembly | B40518-01 | B40518-04 | B40518-02 | B40518-03 | B40518-03 |
| 9 | Electric wire blower | B40590-02 | B40590-02 | B40590-02 | B40590-02 | B40590-02 |
| 10 | Restriction disk | B40699 | B40563-04 | B40698 | B40563-06 | N/A |
| 11 | Pressure switch assembly | B40675-03 | B40675-04 | B40675-05 | B40675-07 | B40675-08 |
| 12 | Gas valve single stage | R01H012 | R01H012 | R01H012 | R01H012 | R01H012 |
| 13 | Control box assembly | B40697 | B40697 | B40697 | B40697 | B40697 |
| 14 | Lower door assembly | B40570-01 | B40570-02 | B40570-02 | B40570-03 | B40570-03 |
| 15 | Upper door assembly | B40571-01 | B40571-02 | B40571-02 | B40571-03 | B40571-03 |
| 16 | Left panel assembly | B40509-01 | B40509-01 | B40509-01 | B40509-01 | B40509-01 |
| 17 | Electric kit main harness | B40591-02 | B40591-02 | B40591-02 | B40591-02 | B40591-02 |
| 18 | Electric kit inducer/ignitor | B40589-01 | B40589-01 | B40589-01 | B40589-02 | B40589-02 |
| 19 | Complete inducer blower ass. | B40578-04 | B40578-01 | B40578-01 | B40578-01 | B40578-01 |
| 20 | Top panel assembly | B40512-01 | B40512-02 | B40512-02 | B40512-03 | B40512-03 |
| 20 | Complete manifold assembly | B40514-03 | B40514-04 | B40514-05 | B40514-07 | B40514-08 |
| 21 | Kit extruded sealant | B04435-01 | B04435-01 | B04435-01 | B04435-01 | B04435-01 |
| 22 | Dettson observation port | B40565 | B40565 | B40565 | B40565 | B40565 |
| 23 | Observation port | L04Z022 | L04Z022 | L04Z022 | L04Z022 | L04Z022 |
| 24 | Grommet | G14F017 | G14F017 | G14F017 | G14F017 | G14F017 |
| 25 | Complete manifold assembly | B40514-03 | B40514-04 | B40514-05 | B40514-07 | B40514-08 |
| 26 | Pressure switch support | B40560 | B40560 | B40560 | B40560 | B40560 |
| 27 | Pressure switch (multiposition) | R99F035 | R99F035 | R99F035 | R99F035 | R99F035 |
| 28 | Pressure switch (high fire) | R99F043 | R99F042 | R99F048 | R99F039 | R99F039 |
| 29 | Drain trap gasket | B40568 | B40568 | B40568 | B40568 | B40568 |
| 30 | Black venting gasket | B40903 | B40903 | B40903 | B40903 | B40903 |
| 31 | Venting flange gasket | B40567 | B40567 | B40567 | B40567 | B40567 |
| 32 | Drain trap | B40760 | B40760 | B40760 | B40760 | B40760 |
| 33 | Venting flange | B40533 | B40533 | B40533 | B40533 | B40533 |
| 34 | Ignitor 120V | R03K005K | R03K005K | R03K005K | R03K005K | R03K005K |
| 35 | High limit burner box | R02N022 | R02N022 | R02N022 | R02N022 | R02N022 |
| 36 | Manifold (item 37 included) | B40527 | B40528 | B40529 | B40531 | B40532 |
| 37 | Orifice #48 natural gas | R04I001 | R04I001 | R04I001 | R04I001 | R04I001 |
| 38 | Flame sensor | R03J005 | R03J005 | R03J005 | R03J005 | R03J005 |
| 39 | Burner Box | B40908-03 | B40908-04 | B40908-05 | B40908-07 | B40908-08 |
| 40 | Clamp 5/8" | G99Z035 | G99Z035 | G99Z035 | G99Z035 | G99Z035 |
| 41 | Elbow 5/8" | G07J007 | G07J007 | G07J007 | G07J007 | G07J007 |
| 42 | Condensate box | B40526-01 | B40526-02 | B40526-02 | B40526-03 | B40526-04 |
| 43 | Heat exchanger thermodisk | R02N026 | R02N024 | R02N023 | R02N024 | R02N024 |
| 44 | Turbulator | B40572 | B40572 | B40572 | B40572 | B40572 |
| 45 | Smoke box | B40539-01 | B40539-02 | B40539-02 | B40539-03 | B40539-04 |
| 46 | Transformer 120v-24v | L01F009 | L01F009 | L01F009 | L01F009 | L01F009 |
| 47 | Control board support | B40559 | B40559 | B40559 | B40559 | B40559 |
| 48 | Control board 1 stage | R99G013K | R99G013K | R99G013K | R99G013K | R99G013K |
| 49 | 1/2" black cap | G14G013 | G14G013 | G14G013 | G14G013 | G14G013 |
| 50 | Inducer blower 1 stage | Z01K007K | Z01K007K | Z01K007K | Z01K007K | Z01K007K |
| 51 | Elbow 1/2" | G07J006 | G07J006 | G07J006 | G07J006 | G07J006 |
| 52 | Sleeve drain | N/A | B40913 | B40913 | B40913 | B40913 |
| 53 | Clamp 1/2" | G99Z034 | G99Z034 | G99Z034 | G99Z034 | G99Z034 |
| 54 | Hose clamp 2-3" | G99Z033 | G99Z033 | G99Z033 | G99Z033 | G99Z033 |
| 55 | Rubber vent flange | B40580 | B40580 | B40580 | B40580 | B40580 |
| 56 | Blower | Z01I033 | Z01I035 | Z01I036 | Z01I038 | Z01I038 |
| 57 | Capacitor support | B01024 | B01024 | B01024 | B01024 | B01024 |
| 58 | Capacitor | L01I002 | L01I002 | L01I005 | L01I003 | L01I003 |
| 59 | Belly band kit | B01889 | B01889 | B01889 | B01889 | B01889 |
| 60 | PSC motor | L06H004 | L06H004 | L06I004 | L06K004 | L06K004 |
| 61 | PSC motor assembly (item 59 included) | B03684-02 | B03684-03 | B01891-07 | B01891-08 | B01891-08 |
| 62 | Door switch | L07H001 | L07H001 | L07H001 | L07H001 | L07H001 |
|  | Inducer blower and PVC elbow ass | — | B40766-01 | B40766-01 | B40766-01 | B40766-01 |
|  | Kit PVC elbow | — | B40818 | B40818 | B40818 | B40818 |
|  | Bottow return base | B40691-01 | B40691-02 | B40691-02 | B40691-03 | B40691-03 |
|  | Downflow base | B40632-01 | B40632-02 | B40632-02 | B40632-03 | B40632-03 |
|  | Cooling coil support | B40693-01 | B40693-02 | B40693-02 | B40693-03 | B40693-03 |
|  | Propane conversion kit | B40574-07 | B40574-10 | B40574-13 | B40574-19 | B40574-22 |
|  | Orifice #56 propane | R04I002 | R04I002 | R04I002 | R04I002 | R04I002 |

**Figure 40 – Exploded view Cxx-2-D part 1**

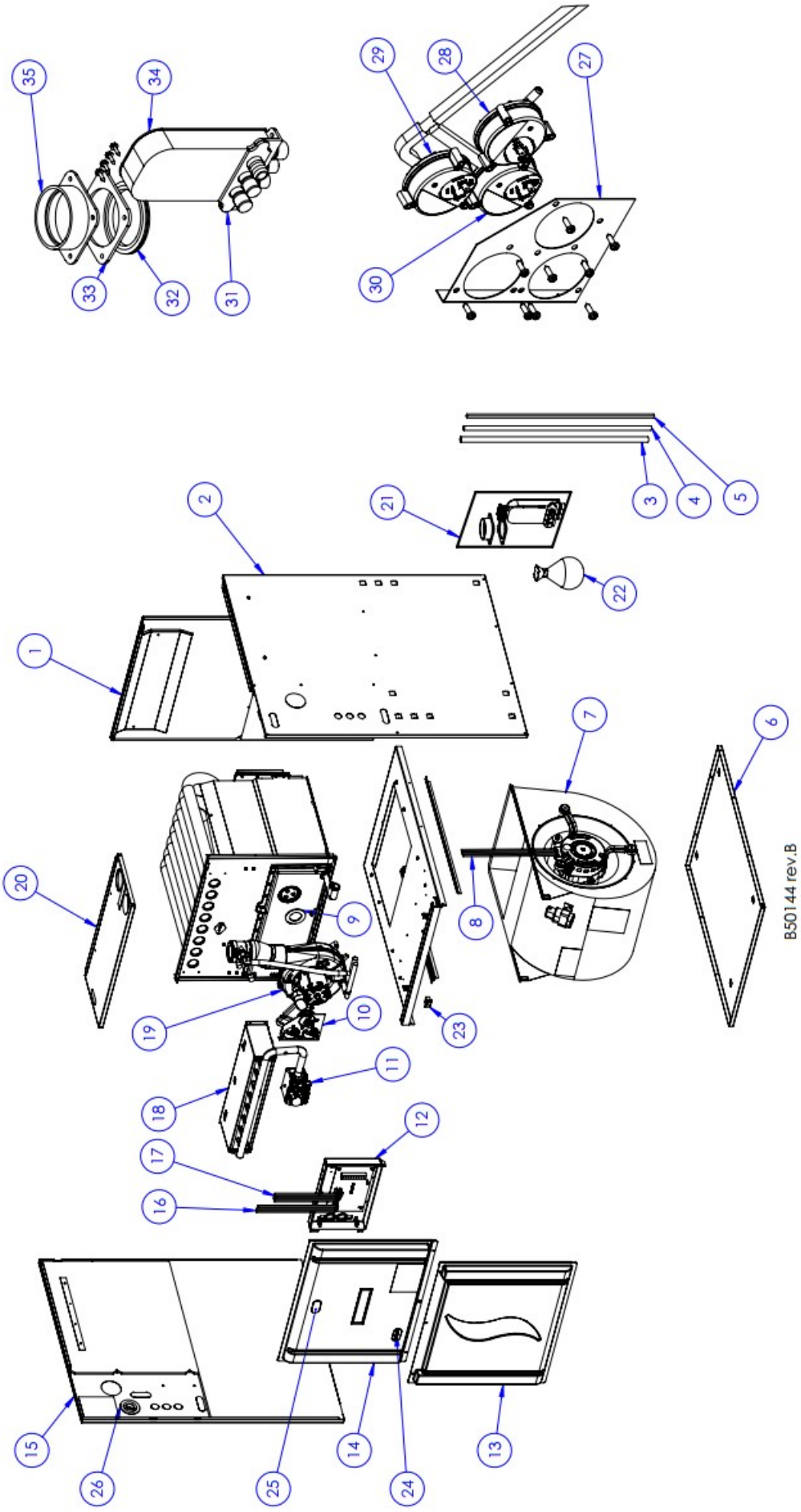
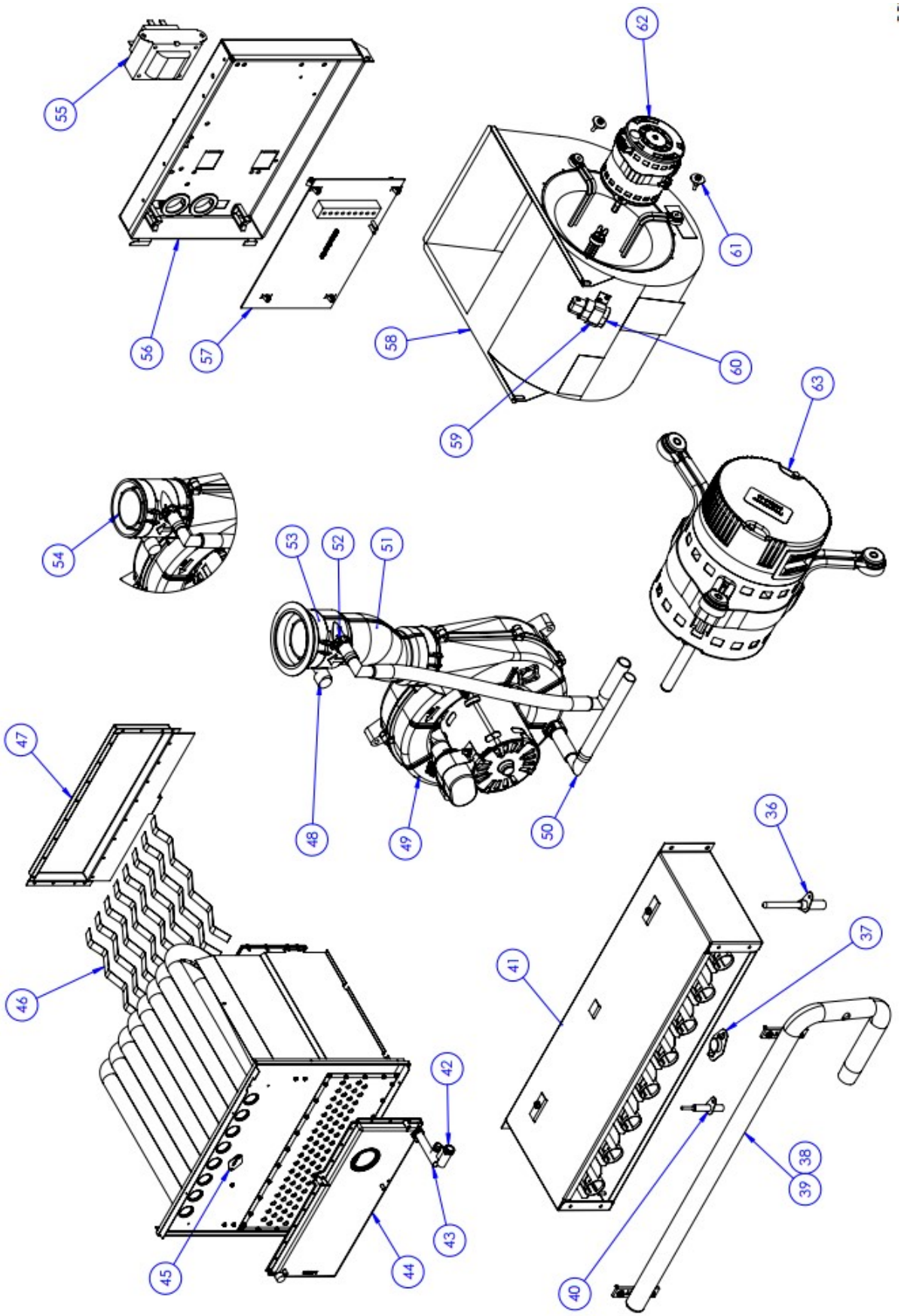


**Figure 41 – Exploded view Cxx-2-D part 2**



## Table 31 – Part list two stage PSC

| # | Description | C45-2-D | C60-2-D | C75-2-D | C105-2-D | C120-2-D |
|---|---|---|---|---|---|---|
| 1 | Back panel assembly | B40511-04 | B40511-05 | B40511-05 | B40511-06 | B40511-06 |
| 2 | Right panel assembly | B40510-34 | B40510-34 | B40510-34 | B40510-34 | B40510-34 |
| 3 | PVC Tube 1/2" | B30157-38 | B30157-38 | B30157-38 | B30157-38 | B30157-38 |
| 4 | PVC Tube 5/8" | B30157-34 | B30157-34 | B30157-34 | B30157-34 | B30157-34 |
| 5 | Square tube 3/16" | B30157-26 | B30157-26 | B30157-26 | B30157-26 | B30157-26 |
| 6 | Floor | B40546-01 | B40546-02 | B40546-02 | B40546-03 | B40546-03 |
| 7 | Blower assembly | B40518-01 | B40518-04 | B40518-02 | B40518-03 | B40518-03 |
| 8 | Electric wire blower | B40594-01 | B40594-01 | B40594-01 | B40594-02 | B40594-02 |
| 9 | Restriction disk | B40699 | B40563-04 | B40698 | B40563-06 | N/A |
| 10 | Pressure switch assembly | B40675-11 | B40675-12 | B40675-13 | B40675-15 | B40675-16 |
| 11 | Gas valve | R01I003 | R01I003 | R01I003 | R01I003 | R01I003 |
| 12 | Control box assembly | B40696 | B40696 | B40696 | B40696 | B40696 |
| 13 | Lower door assembly | B40570-04 | B40570-05 | B40570-05 | B40570-06 | B40570-06 |
| 14 | Upper door ass | B40571-01 | B40571-02 | B40571-02 | B40571-03 | B40571-03 |
| 15 | Left panel ass. | B40509-01 | B40509-01 | B40509-01 | B40509-01 | B40509-01 |
| 16 | Electric kit inducer/blower | B40592-01 | B40592-01 | B40592-01 | B40592-02 | B40592-02 |
| 17 | Electric kit main harness | B40593-01 | B40593-01 | B40593-01 | B40593-02 | B40593-02 |
| 18 | Complete manifold assembly | B40514-03 | B40514-04 | B40514-05 | B40514-07 | B40514-08 |
| 19 | ID blower assembly | B40578-05 | B40578-02 | B40578-02 | B40578-02 | B40578-02 |
| 20 | Top panel assembly | B40512-01 | B40512-02 | B40512-02 | B40512-03 | B40512-03 |
| 21 | Part bag | B40569-01 | B40569-02 | B40569-02 | B40569-02 | B40569-02 |
| 22 | Extruded seal | B04435-01 | B04435-01 | B04435-01 | B04435-01 | B04435-01 |
| 23 | Door switch | L07H001 | L07H001 | L07H001 | L07H001 | L07H001 |
| 24 | Dettson observation port | B40565 | B40565 | B40565 | B40565 | B40565 |
| 25 | Observation port | L04Z022 | L04Z022 | L04Z022 | L04Z022 | L04Z022 |
| 26 | Grommet | G14F017 | G14F017 | G14F017 | G14F017 | G14F017 |
| 27 | Pressure switch support | B40560 | B40560 | B40560 | B40560 | B40560 |
| 28 | Pressure switch (multiposition) | R99F035 | R99F035 | R99F035 | R99F035 | R99F035 |
| 29 | Pressure switch (high fire) | R99F043 | R99F042 | R99F048 | R99F039 | R99F041 |
| 30 | Pressure switch (low fire) | R99F039 | R99F050 | R99F050 | R99F050 | R99F050 |
| 31 | Drain trap gasket | B40568 | B40568 | B40568 | B40568 | B40568 |
| 32 | Black venting gasket | B40903 | B40903 | B40903 | B40903 | B40903 |
| 33 | Venting flange gasket | B40567 | B40567 | B40567 | B40567 | B40567 |
| 34 | Drain trap | B40760 | B40760 | B40760 | B40760 | B40760 |
| 35 | Venting flange | B40533 | B40533 | B40533 | B40533 | B40533 |
| 36 | Igniter 120V | R03K005K | R03K005K | R03K005K | R03K005K | R03K005K |
| 37 | Roll out switch | R02N022 | R02N022 | R02N022 | R02N022 | R02N022 |
| 38 | Gas manifold assembly | B40527 | B40528 | B40529 | B40531 | B40532 |
| 39 | Orifice #48 natural gas | R04I001 | R04I001 | R04I001 | R04I001 | R04I001 |
| 40 | Flame detector | R03J005 | R03J005 | R03J005 | R03J005 | R03J005 |
| 41 | Burner Box | B40908-03 | B40908-04 | B40908-05 | B40908-07 | B40908-08 |
| 42 | Clamp 5/8" | G99Z035 | G99Z035 | G99Z035 | G99Z035 | G99Z035 |
| 43 | Elbow 5/8" | G07J007 | G07J007 | G07J007 | G07J007 | G07J007 |
| 44 | Condensate box | B40526-01 | B40526-02 | B40526-02 | B40526-03 | B40526-04 |
| 46 | High limit | R02N026 | R02N024 | R02N023 | R02N024 | R02N024 |
| 45 | Heat exchanger thermodisk | R02N026 | R02N024 | R02N023 | R02N024 | R02N024 |
| 46 | Baffle | B40572 | B40572 | B40572 | B40572 | B40572 |
| 47 | Smoke box | B40539-01 | B40539-02 | B40539-02 | B40539-03 | B40539-04 |
| 48 | 1/2" black cap | G14G013 | G14G013 | G14G013 | G14G013 | G14G013 |
| 49 | ID blower 2 stage | Z01K006K | Z01K006K | Z01K006K | Z01K006K | Z01K006K |
| 50 | Elbow 1/2" | G07J006 | G07J006 | G07J006 | G07J006 | G07J006 |
| 51 | Sleeve drain | N/A | B40913 | B40913 | B40913 | B40913 |
| 52 | Clamp 1/2" | G99Z035 | G99Z035 | G99Z035 | G99Z035 | G99Z035 |
| 53 | Hose clamp 2-3" | G99Z033 | G99Z033 | G99Z033 | G99Z033 | G99Z033 |
| 54 | Rubber vent flange | B40580 | N/A | N/A | N/A | N/A |
| 55 | Transformer 120v-24v | L01F009 | L01F009 | L01F009 | L01F009 | L01F009 |
| 56 | Control board support | B40559 | B40559 | B40559 | B40559 | B40559 |
| 57 | Control board 2 stage PSC | R99G015K | R99G015K | R99G015K | R99G015K | R99G015K |
| 58 | Blower | Z01I033 | Z01I035 | Z01I036 | Z01I038 | Z01I038 |
| 59 | Condensator support | B01024 | B01024 | B01024 | B01024 | B01024 |
| 60 | Condensator | L01I002 | L01I002 | L01I005 | L01I003 | L01I003 |
| 61 | Motor mounting bracket | B01889 | B01889 | B01889 | B01889 | B01889 |
| 62 | PSC motor | L06H004 | L06H004 | L06I004 | L06K004 | L06K004 |
| 63 | Motor assembly (with legs) | B03684-02 | B03684-03 | B01891-07 | B01891-08 | B01891-08 |
| — | ID blower and elbow assembly | — | B40766-02 | B40766-02 | B40766-02 | B40766-02 |
| — | ID blower PVC elbow | — | B40818 | B40818 | B40818 | B40818 |
| | Bottom return base assembly | B40691-01 | B40691-02 | B40691-02 | B40691-03 | B40691-03 |
| | Downflow base | B40632-01 | B40632-02 | B40632-02 | B40632-03 | B40632-03 |
| | Transition for A coil | B40693-01 | B40693-02 | B40693-02 | B40693-03 | B40693-03 |
| | Conversion kit propane | B40574-08 | B40574-11 | B40574-14 | B40574-20 | B40574-23 |
| | Orifice #56 LP | R01I002 | R01I002 | R01I002 | R01I002 | R01I002 |