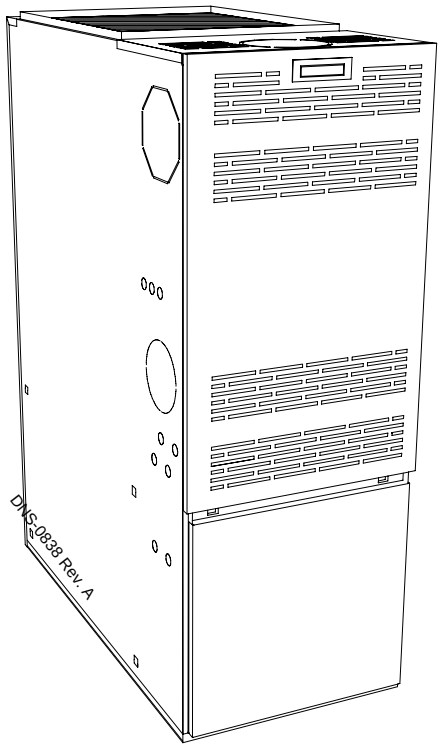
Installation Instructions and Homeowner's Manual



Models:

NOMF105D12C
NOMF155E19C

NOMF106D12B
NOMF156E19B

MULTI-POSITION INSTALLATIONS WITH CHIMNEY

MULTI-POSITION WARM AIR FURNACE

Save these instructions for future reference

Manufactured by :

UTC Canada Corporation
ICP Division
3400, Industrial Boulevard
Sherbrooke, Quebec J1L 1V8

Caution : Do not tamper with the unit or its controls. Call a qualified service technician.

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PART 1
INSTALLATION

SAFETY CONSIDERATIONS

INSTALLATION OF OIL FIRED HEATING UNITS SHALL BE IN STRICT ACCORDANCE WITH THE REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION. IN CANADA, CSA B139 AND IN THE UNITED STATES, NFPA NO.31-1992 INSTALLATION CODES FOR OIL BURNING EQUIPMENT APPLY.

DO NOT OPERATE FURNACE IN A CORROSIVE ATMOSPHERE CONTAINING CHLORINE, FLUORINE OR ANY OTHER DAMAGING CHEMICALS.

DO NOT STORE OR USE GASOLINE, OR OTHER FLAMMABLE VAPOURS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

1.1) SAFETY LABELLING AND WARNING SIGNS

DANGER, WARNING AND CAUTION

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 injury.

WARNING

Hazards or unsafe practices which CAN result in death or injury.

CAUTION

Hazards or unsafe practices which **CAN** result in personal injury, product or property damage.

1.2) SAFE INSTALLATION REQUIREMENTS

WARNING

Installation or repairs performed by unqualified persons can result in hazards to themselves and others. Installation MUST conform to local codes or, in the absence of same, to codes of the country having jurisdiction.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

Failure to carefully read and follow all instructions in this manual can result in furnace malfunction, property damage, personal injury and/or death.

WARNING

Fire hazard.

The furnace must be installed in a level position; never where it will slope toward the front.

If the furnace is installed in that position, oil will drain into the furnace vestibule and create a fire hazard.

NOTE: It is the personal responsibility and obligation of the customer to contact a qualified installer to ensure that the installation conforms to governing local and/or national codes and regulations.

a. This furnace is **NOT** approved for installation in mobile homes, trailers or recreational vehicles;
b. Do **NOT** use this furnace as a construction heater or to heat a building under construction;
c. There must be a sufficient supply of fresh air for combustion as well as ventilation in the area where the furnace is located;
d. Use only the type of fuel oil approved for this furnace (see **Rating Plate** on unit). Overfiring will result in heat exchanger failure and cause dangerous operating conditions;
e. Visually check all oil line joints for signs of leakage;
f. Connect furnace to a side-wall terminal or chimney;
g. The points in Part 2 “Operation” are vital to the proper and safe operation of the heating system. Take the time to ensure that all steps were followed;
h. Follow the regulations of the ANSI / NFPA installation code (in the USA) and CSA B-139 (in Canada) or local codes for placing and installing the oil storage tank;
i. Follow a regular service and maintenance schedule for the most efficient and safe operation of the furnace;

j. Before servicing, allow furnace to cool down. Always shut off electricity and fuel to the furnace when servicing. This will prevent electrical shock or burns;

k. Seal supply and return air ducts;

l. The vent system **MUST** be checked to determine that it is the correct type and size;

m. Install the proper filter type and size;

n. The unit **MUST** be installed so that electrical components are protected from direct contact with water.

1.2.1) Safety Rules

Your unit is built to provide many years of safe and dependable service, provided it is properly installed and maintained. Abuse and/or improper use can shorten the life of the unit and create hazards for you, the owner.

a. The U.S. Consumer Product Safety Commission recommends that users of oil or gas-burning appliances install carbon monoxide detectors. Carbon monoxide can cause serious injury and/or death. Therefore, to help alert people of potentially dangerous carbon monoxide levels, you should have carbon monoxide detectors listed by a nationally recognised agency (e.g. Underwriters Laboratories or International Approval Services) installed and maintained in the building or dwelling (see Note below).

b. There can be numerous sources of fire or smoke in a building or dwelling. Fire or smoke can cause serious injury, death, and/or property damage. Therefore, in order to alert people to potentially dangerous fire or smoke conditions, you should have Underwriters Laboratories listed fire and smoke detectors installed and maintained in the building or dwelling (see Note below).

NOTE : The manufacturer of your furnace does not test detectors and makes no representations regarding any brand or type of detector.

CAUTION

Ensure that the area around the combustion air intake terminal is free of snow, ice and debris**.**

1.2.2) Freezing temperatures and your building

WARNING

Freezing temperature warning.

Turn off water supply.

If your heater remains shut off during cold weather, the water pipes could freeze and burst, resulting in serious water damage.

If the structure is unattended during cold weather you should take the following precautions:

a. Turn off main water supply into the structure and drain the water lines if possible. Open faucets in appropriate areas;

b. Have someone check the structure frequently during cold weather to make sure it is warm enough to prevent pipes from freezing. Contact a qualified service agency, if required.

1.2.3) Installation Regulations

All local and national code requirements governing the installation of oil burning equipment, wiring and flue connections MUST be followed. Some of the codes that may be applicable are:

CSA B139	INSTALLATION CODE FOR OIL BURNING EQUIPMENT
NFPA 31	INSTALLATION OF OIL BURNING EQUIPMENT
ANSI/NFPA 90B	WARM AIR HEATING AND AIR CONDITIONING SYSTEMS
ANSI/NFPA 70	NATIONAL ELECTRICAL CODE
CSA C22.1	CANADIAN ELECTRICAL CODE
ANSI/NFPA 211	CHIMNEYS, FIREPLACES, VENTS AND SOLID FUEL BURNING APPLIANCES

Only the latest issues of the above codes should be used.

1.3) POSITIONING THE FURNACE

CAUTION

Carefully check your furnace upon delivery for any evidence of damage that may have occurred during shipping and handling. Any claims for damages or lost parts must be made with the Transport Company.

The unit must be installed in a location where the ambient and return air temperatures are over 15°C (60°F).

As this unit may be installed in an upflow, counterflow or horizontal configuration (right or left), it may be located in a basement, on the same level as the area to be heated, suspended, or in a crawlspace. In any case, the unit should always be installed level.

In a basement, or when installed on the floor (as in a crawlspace), it is recommended that the unit be installed on a concrete pad that is 25.4 mm to 50.8 mm (1" to 2") thick.

When installed in the counterflow position, this furnace must not be installed on combustible flooring, unless the approved sub-base is used (Model DFB-101). The flue pipe must exit the cabinet through one of the panel openings, then extended up the side of the furnace. Care must be taken to ensure that the clearances from the flue pipe to combustible construction are maintained.

Also, the use of a flue pipe guard kit (Model FPG-101 or FPG-102) is recommended to eliminate fire hazard conditions.

When installed in a horizontal position, the furnace may be suspended by using an angle iron frame, as long as the total weight of both the furnace and the frame are added into the calculations for the support. (Other methods of suspension are acceptable.) When installed in the horizontal position, this furnace must not be installed on combustible flooring, unless the approved sub-base is used (Model HFB-101).

This furnace is approved for reduced clearances to combustible construction. Therefore, it may be installed in a closet or similar enclosure.

The required minimum clearances for this furnace in the various configurations are specified in Tables 3 and 3.1.

The furnace should be located as closely as possible to the chimney or vent in order to keep vent connections shorts and direct. The furnace should also be located as closely as possible to the center of the air distribution system.

CAUTION

Do **NOT** operate the furnace in a corrosive atmosphere containing chlorine, fluorine or any other damaging chemicals. Refer to Part 1, Section 5.2 (1.5.2).

WARNING

Electrical shock hazard.

This furnace is not watertight and is not designed for outdoor installation. This furnace shall be installed in such a manner as to protect the electrical components from water.

Outdoor installation will lead to a hazardous electrical condition and to premature furnace failure, property damage, injury and/or death.

1.4) VENTING

WARNING

Poisonous carbon monoxide gas, fire and explosion hazard.

Read and follow all instructions in this section.

Failure to properly vent this furnace can result in property damage, injury and/or death.

CAUTION

When the furnace is chimney vented together with other combustion appliances such as a water heater, the allowable venting materials for use with those appliances must be investigated ("L"-Vent etc.)

WARNING

Poisonous carbon monoxide gas hazard.

Never install a hand operated damper in the vent pipe. However, any Underwriters Laboratories listed electrically operated automatic type vent damper may be installed if desired. Be sure to follow the instructions provided with the vent damper. Read and follow all instructions in this section.

Failure to properly vent this furnace or other appliances can result in property damage, personal injury and/or death.

The furnace must be vented to the outside, in accordance with local codes and other authorities having jurisdiction.

OIL FIRED APPLIANCES SHALL BE CONNECTED TO FLUES HAVING SUFFICIENT DRAFT AT ALL TIMES TO ENSURE SAFE AND PROPER OPERATION OF THE APPLIANCE.

For additional venting information refer to ANSI/NFPA 211 Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances and/or CSA B139 Installation Code.

This furnace is certified for use with a Type "L" vent (maximum flue gas temperature 302°C (575°F)). The flue pipe clearance knockout in the front top or side panel should be removed. Install the flue elbow so that it exits the furnace cabinet through that opening.

Pre-installation vent system inspection

Before this furnace is installed, it is strongly recommended that any existing vent system be completely inspected.

On any chimney or vent, this should include the following:

a. Inspection for any deterioration in the chimney or vent. If deterioration is discovered, the chimney must be repaired or the vent must be replaced;
b. Inspection to ascertain that the vent system is clear and free of obstructions. Any blockages must be removed before installing this furnace;
c. Cleaning the chimney or vent if previously used for venting a solid fuel burning appliance or fireplace;
d. Confirming that all unused chimney or vent connections are properly sealed;
e. Verification that the chimney is properly lined and sized per the applicable codes. (Refer to list of codes on page 4.)

Masonry Chimney

This furnace can be vented into an existing masonry chimney. This furnace must not be vented into a chimney servicing a solid fuel-burning appliance. Before venting this furnace into a chimney, the chimney must be checked for deterioration and repaired if necessary. The chimney must be properly lined and sized per local or national codes.

If the furnace is vented into a common chimney, the chimney must be of sufficient area to accommodate the total flue products of all appliances vented into the chimney.

The following are requirements for a safe venting system:

a. Ensure that the chimney flue is clear of any dirt or debris;
b. Ensure that the chimney is not servicing an open fireplace;
c. Never reduce the pipe size below the outlet size of the furnace;
d. All pipes should be supported using the proper clamps and/or straps. These supports should be located at least every 1.2 m (4');
e. All horizontal runs of pipe should have at least a 6.4 mm (1/4") upward slope per 0.3 m (1');
f. All runs of pipe should be as short as possible with as few turns as possible;
g. Seams should be tightly joined and checked for leaks;
h. The flue pipe must not extend into the chimney but be flush with the inside wall;
i. The chimney must extend 0.9 m (3') above the highest point where it passes through a roof of a building and at least 0.6 m (2') higher than any portion of a building within a horizontal distance of 3.0 m (10'). It shall also be extended at lest 1.5 m (5') above the highest connected equipment flue collar;
j. Check local codes for any variances.

Factory built chimneys

This furnace may be used with an approved factory built chimney. Refer to chimney manufacturer's instructions for proper installation.

1.4.1) Barometric draft control

The barometric draft control shipped with the furnace MUST be used to ensure proper operation. Installation instructions are supplied with the control.

1.4.2) Blocked vent shut-off (BVSO) For chimney venting

WARNING

It is imperative that this device be installed by a qualified agency.

This device is designed to detect the insufficient evacuation of combustion gases in the event of a vent blockage. In such a case the thermal switch will shut down the oil burner. The device will then need to be re-armed MANUALLY.

Refer to figurers 1 to 6, wiring diagrams and the detailed instructions supplied with the BVSO for the installation and wiring procedures. The length of wires supplied with the unit is such that the safety device must be installed between the flue outlet of the appliance and the draft regulator, as indicated in the instructions.

It is also essential that the BVSO be maintained annually. For more details refer to the instructions supplied with the device itself, as well as Section 3. of this Manual.

CAUTION

A positive pressure venting system (Sealed Combustion System or Direct Vent) MUST NOT use the BVSO. Follow the instructions supplied with the venting system.

FIGURE 1

Blocked Vent Shut-Off device wiring
Installation shown: Upflow with vertical exhaust

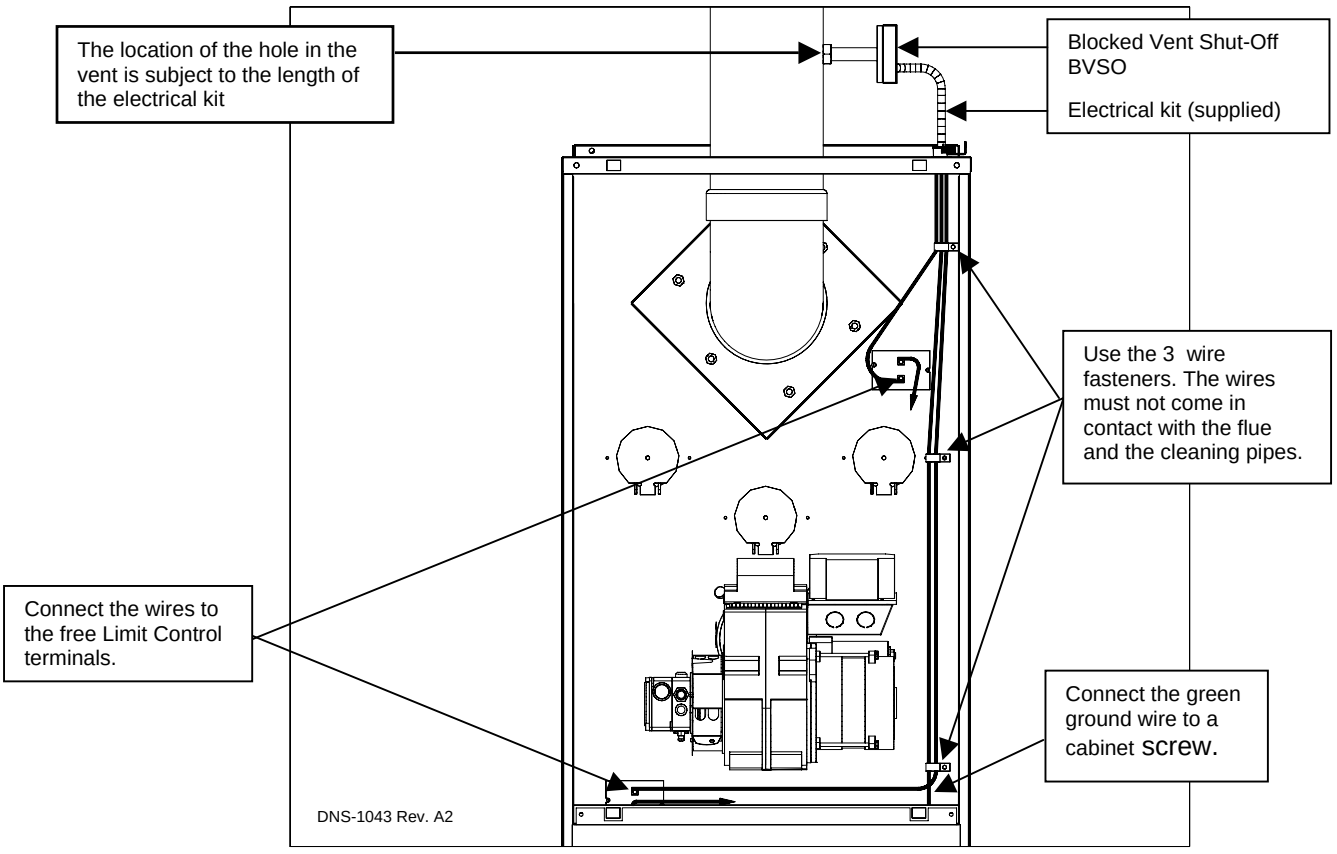


FIGURE 2

Blocked Vent Shut-Off device wiring
Installation: Upflow with vertical exhaust

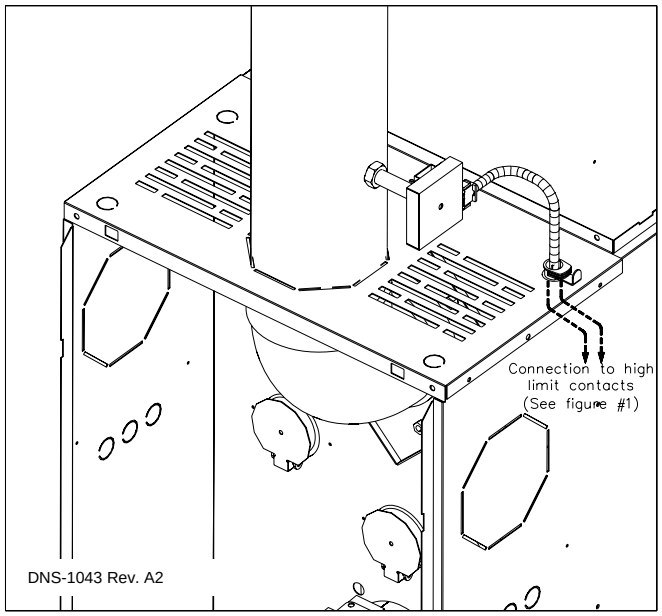


FIGURE 3

Blocked Vent Shut-Off device wiring
Installation: Upflow with horizontal exhaust

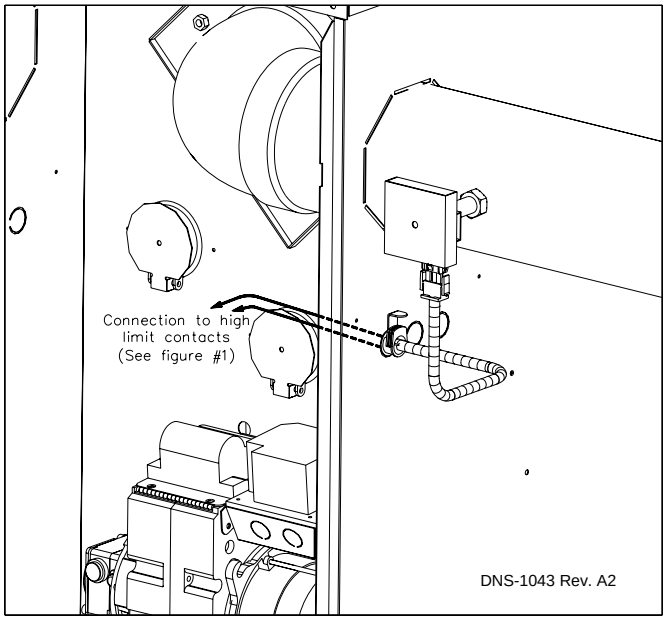


FIGURE 4

Blocked Vent Shut-Off device wiring
Installation: Horizontal with horizontal exhaust

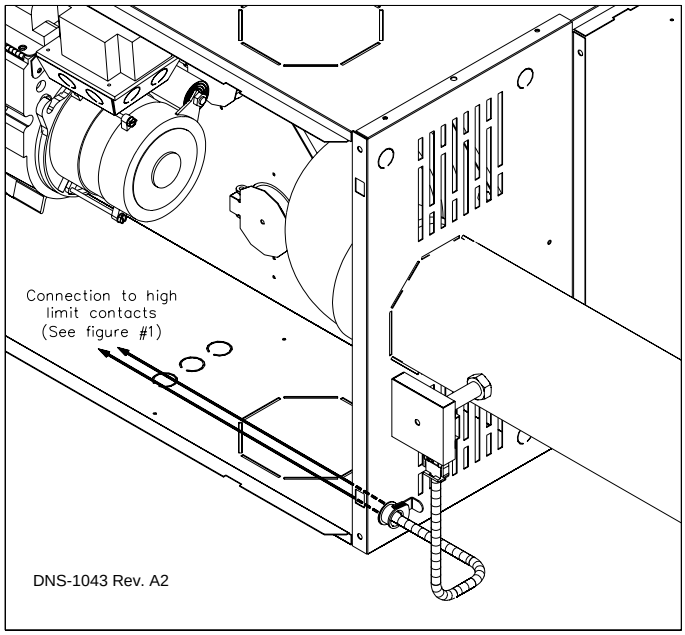


FIGURE 5

Blocked Vent Shut-Off device wiring
Installation: Horizontal with vertical exhaust

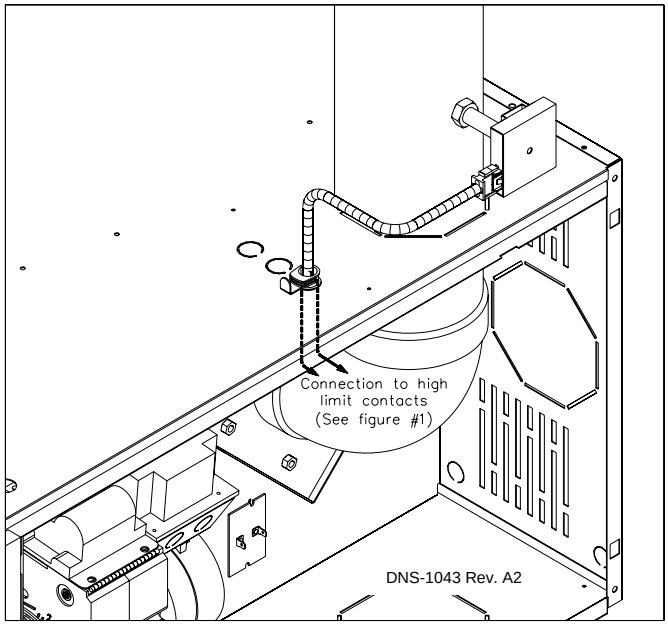
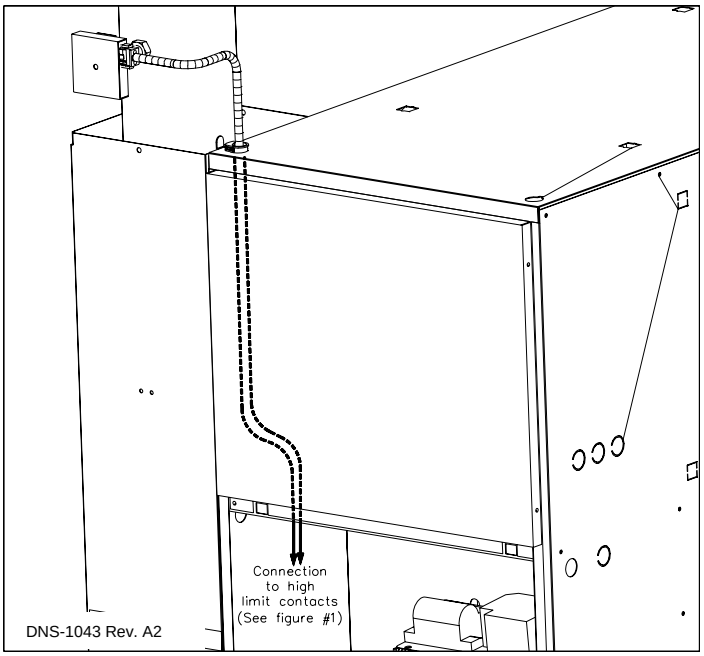


FIGURE 6

Blocked Vent Shut-Off device wiring
Installation: Downflow



1.5) COMBUSTION AIR

WARNING

Poisonous carbon monoxide gas hazard.

Comply with ANSI/NFPA (U.S.) or CSA (Canada) standards for the installation of Oil Burning Equipment and applicable provisions of local building codes to provide combustion and ventilation air.

Failure to provide adequate combustion and ventilation air can result in personal injury and/or death.

1.5.1) General

Oil furnaces must have an adequate supply of combustion air. It is common practice to assume that older homes have sufficient infiltration to accommodate the combustion air requirements for the furnace. However, home improvements such as new windows, doors, and weather stripping have dramatically reduced the volume of air infiltration to the home.

If this furnace is installed in a closet or enclosure, 2 ventilation openings are required for combustion air. The openings should be located about 152.4 mm (6") from the top and the bottom of the enclosure at the front of the furnace. Table 1 indicates the minimum opening dimensions required.

TABLE 1

Input (BTU/h)	Width	Height
75,000 – 105,000	0.40 m (16")	0.20 m (8")
120,000 – 155,000	0.50 m (20")	0.25 m (10")

Home air exhausters are quite common. Bathroom and kitchen fans, power vented clothes dryers, and water heaters all tend to create negative pressure in the home. Should this occur, the chimney becomes less and less effective and can easily downdraft.

Heat Recovery Ventilation (HRV) systems are gaining in popularity. HRVs are not designed to supply combustion air. If not properly balanced, a serious negative pressure condition could develop in the dwelling.

1.5.2) Contaminated Combustion Air

Installations in certain areas or types of structures will have increased exposure to chemicals or halogens which may harm the furnace. These instances will require that only outside air be used for combustion.

The following areas or types of structures may contain or be exposed to the substances listed below. The installation must be carefully evaluated, as it may be necessary to provide outside air for combustion.

a. Commercial buildings;
b. Buildings with indoor pools;
c. Furnaces installed near chemical storage areas.

Exposure to these substances:

a. Permanent wave chemicals for hair;
b. Chlorinated waxes and cleaners;
c. Chlorine based swimming pool chemicals;
d. Water softening chemicals;
e. De-icing salts or chemicals;
f. Carbon tetrachloride;
g. Halogen type refrigerants;
h. Cleaning solvents (such as perchloroethylene);
i. Printing inks, paint removers, varnishes, etc.;
j. Hydrochloric acid;
k. Solvent based cements and glues;
l. Antistatic fabric softeners for clothes dryers;
m. Acid based masonry cleaning materials.

1.6) OIL TANKS AND LINES

Check your local codes for the installation of the tank and accessories.

A manual shut-off valve and an oil filter shall be installed in sequence from tank to burner. Be sure that the oil line is clean before connecting to the burner. The oil line should be protected to eliminate any possible damage. Installations where the fuel oil tank is below the burner level must employ a two pipe fuel supply system with an appropriate fuel pump; for more than an 2.4 m (8') rise use a 2 stage pump and for more than a 4.9 m (16') rise use an auxiliary pump).

Follow the pump instructions to determine the size of pipe you need in relation to the rise, or the horizontal distance.

At the beginning of each heating season or once a year, check the complete oil distribution system for leaks.

1.7) BURNER INSTALLATION

IMPORTANT: The burner must always be installed in the upright position with the ignition control on top.

CAUTION

NEVER use the "interrupted ignition" function if a Honeywell R7184 series combustion relay is installed on the burner.

Mounting the burner

1. The warm air furnace burner mounting plate has a 4-bolt configuration;
2. Position the mounting gasket between the mounting flange and the appliance burner mounting plate. Line up the holes in the mounting flange with the studs on the appliance mounting plate and securely bolt in place.

After the burner is mounted

1. Remove drawer assembly or air tube combination;
2. Install nozzle (see specifications);
3. Confirm electrode settings;
4. Make the electrical connections;
5. Complete oil line connections.

CAUTION

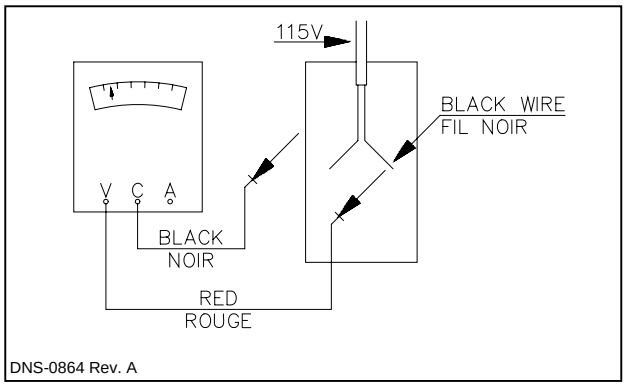
Do not turn on the burner until you have checked the following:

Checking the polarity

The oil burners used on furnaces have solid state control systems which make them sensitive to the proper connections of the hot and neutral power lines. The controls will be damaged if the 2 lines are reversed.

1. Set your voltmeter to line voltage;
2. Place one prong on your grounded electric entry box and one prong on the black wire;
3. Read the voltage;
4. If the voltage is zero, check the white wire. If line voltage shows, reverse the 115-volt leads entering the furnace junction box (see Figure 7).
5. If you don't have a voltmeter, use a pilot light.

FIGURE 7



Checking the nozzle

The burner is equipped with an appropriate nozzle. However, if another size or a replacement nozzle is required, use the manufacturer's nozzle data concerning spray angle, as shown in Table 2. Note that all nozzle sizes are based on a pump pressure of 100 psi.
Always select nozzle sizes by working back from the actual desired flow rate at operating pressure, and not by the nozzle marking.

Checking the air and turbulator settings

Before starting the burner for the first time, adjust the air and turbulator settings to those listed in Table 2. Once the burner becomes operational, final adjustments will be necessary.

Checking the fuel supply system

Fuel Specifications

NOTE: Use No.1 or No.2 Heating Oil (ASTM D396) or in Canada, use No.1 or No.2 Furnace Oil.

Before starting the burner be sure the fuel tank is filled with clean oil.

WARNING

Fire and explosion hazard.

Use only approved heating type oil in this furnace. DO NOT USE waste oil, used motor oil, gasoline or kerosene.

Use of these will result in property damage, injury or death.

NOTE: You may notice a slight odour the first time your furnace is operated. This will soon disappear. It is only the oil used on the parts during manufacturing.

1.8) INSTALLING ACCESSORIES

WARNING

Electrical shock hazard.

Turn OFF electric power at fuse box or service panel before making any electrical connections and ensure a proper ground connection is made before connecting line voltage.

Failure to do so could result in property damage, injury or death.

1.8.1) Air conditioning

An air conditioning coil may be installed on the supply air side only. Also, a minimum clearance must be allowed between the bottom of the coil drain pan and the top of the heat exchanger as per the coil manufacturer's instructions. Wire the thermostat and condensing unit contactor as indicated on the wiring diagram (Figures 9, 9.1, 9.2 and 9.3).

1.8.2) Ductwork and Filter

Installation

Design and install the air distribution system to comply with Air Conditioning Contractors of America manuals or other approved methods that conform to local and/or national codes and good trade practices.

Knockouts are provided on both sides of the furnace to cut the required size opening for the installation of the return ductwork. This can be done on either the right or the left side of the furnace. See Figures 10 and 10.1 for location and dimensions.

NOTE: THE BACK OF THE FURNACE SHOULD NOT BE CUT OUT FOR RETURN AIR

Provision is made on this furnace for a bottom return air duct. Knockouts are provided in the floor, to facilitate the cut out for the air filter rack and return air ductwork. We recommend the use of this opening for horizontal installations as well.

CAUTION

When ducting supplies air to a space other than where the furnace is located, the return air ducts must be sealed and also be directed to the space other than where the furnace is located. Incorrect ductwork termination and sealing will create a hazardous condition which can lead to bodily harm.

Install air conditioning cooling coil (evaporator) downstream from the furnace, in the supply air plenum.

If separate evaporator and blower units are used, install a good sealing damper for air flow control. Cold air from the evaporator coil going through the furnace can cause condensation and shorten furnace life.

CAUTION

Dampers (purchased locally) MUST be automatic.

WARNING

Poisonous carbon monoxide gas hazard.

Do NOT draw return air from inside a closet or utility room. Return air duct MUST be sealed to furnace casing.

Failure to properly seal duct can result in death, personal injury and/or property damage.

WARNING

Poisonous carbon monoxide gas hazard.

Install evaporator coil on the supply side of the furnace ducting.

Evaporator coil installed in return side ducting can cause condensation to form inside heat exchanger resulting in heat exchanger failure. This could result in death, personal injury and/or property damage.

PART 2
OPERATION

2.1) SEQUENCE OF OPERATION

2.1.1) Sequence of operation - Beckett AFG

1. Normally open contact (T-T) on primary relay closed when thermostat calls for heat;
2. The motor starts and spark is established. The pump pressure builds and the oil supply mechanism opens, admitting fuel to the nozzle;
3. Spark ignites oil droplets;
4. Cad cell senses flame and burner continues to fire;
5. After 60 seconds, the fan control starts the circulating air blower and electronic air cleaner;
6. The circulating air blower and burner motor remain on until the thermostat is satisfied. The ignition transformer continues to spark;

Thermostat is satisfied:

7. Primary relay contacts open and the burner fan motor shuts down. The ignition transformer ceases sparking;
8. Depending on the delay of the fan control setting, the circulating air blower stops after 60, 90, 120 or 150 seconds. (See Part 2, Section 2.4).

2.2) CHECKS AND ADJUSTMENTS

2.2.1) General

During initial start-up and subsequent yearly maintenance calls, the furnace must be thoroughly tested.

IMPORTANT

The burner must be put in operation for at least 10 minutes before any test readings are taken. On a new installation, set up the burner to the settings as per Table 2, before firing. These are rough adjustments but they ensure that the burner will start and run smoke-free before fine tuning is performed.

Open the oil bleed port screw and start the burner. Allow the oil to drain into a container for at least 10 seconds. Slowly close and tighten the bleed screw. The oil should flow absolutely free of white streaks or air bubbles to indicate that no air is being drawn into the suction side of the oil piping and pump. Fire the burner. Adjust the oil pressure as indicated in Table 2.

2.2.2) Restart after burner failure

1. Set thermostat lower than the room temperature;
2. Press the reset button on the burner primary control (relay);
3. Set thermostat higher than the room temperature;
4. If the burner motor does not start or ignition fails, turn off the disconnect switch and CALL A QUALIFIED SERVICE TECHNICIAN.

CAUTION

Do not attempt to start the burner when excess oil has accumulated, when the furnace is full of vapour, or when the combustion chamber is very hot.

2.2.3) Smoke / CO_2 test

1. Pierce a test hole in the smoke pipe near the furnace breech. Insert the smoke test instrument probe into the hole;
2. Starting with a zero smoke reading, gradually reduce the burner air setting until just a trace of smoke results (#1 on the Bacharach Scale);
3. Take a CO_2 sample at the same test location where the smoke sample was taken. Note the CO_2 reading associated with the #1 smoke condition;
4. Adjust the burner air setting to obtain a CO_2 reading 1% lower than the reading associated with the #1 smoke;
5. This method of adjusting the CO_2 will provide adequate excess air to ensure that the burner will burn clean for the entire heating season.

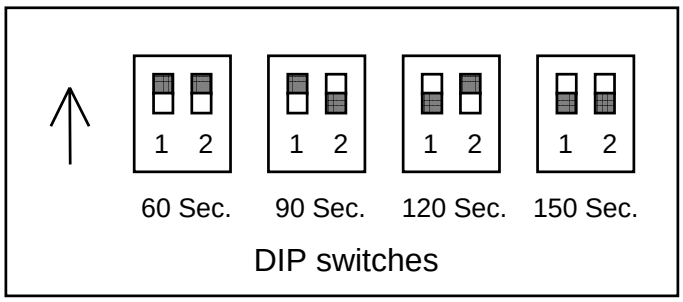
2.2.4) FAN ADJUSTMENT CHECK

This furnace is equipped with a 4 speed direct drive motor to deliver a temperature rise within the range specified on the rating plate, between the return and supply pressure at the external duct static pressure noted on the rating label.

Adjust the fan speed ACCORDING TO THE OIL INPUT SELECTED, so that the temperature rise is within the specifications on the rating plate (see Table 2.1). Consult the wiring diagram for speed changes on the direct drive motor.

To adjust the fan “OFF” setting, adjust the DIP switches on the control board for the desired length as per Figure 8.

FIGURE 8
Adjustment of fan “OFF” settings



2.2.5) Limit control check

After the furnace has been in operation for at least 15 minutes, restrict the return air supply by blocking the filters or closing the return air registers and allow the furnace to shut down on High Limit. The burner will shut OFF and the main blower should continue to run.

Remove the restriction and the burner should come back on in a few minutes.

2.2.6) Year-round air conditioning

The furnace is designed for use in conjunction with cooling equipment to provide year round air conditioning. The blower has been sized for both heating and cooling, however, the fan motor speed may need to be changed to obtain the necessary cooling air flow.

2.2.7) Heating

The blower speed is factory set to deliver the required airflow at normal duct static pressure.

2.2.8) Cooling

The blower speed may be adjusted in the field to deliver the required airflow for cooling applications, as outlined in Table 2.1.

2.2.9) Constant Blower Switch

This furnace is equipped with a constant, low speed blower option. Whenever the room thermostat is not calling for heating or cooling, the blower will run on low speed in order to provide air circulation. If this constant blower option is not desired, the rocker switch on the side of the control box can be used to turn off this feature.

PART 3
MAINTENANCE

3.1) GENERAL

Preventive Maintenance

Preventive maintenance is the best way to avoid unnecessary expense and inconvenience. Have your heating system and burner inspected at regular intervals by a qualified service technician.

After each annual inspection a complete combustion test must be performed, in order to maintain optimum performance and reliability.

WARNING

Electrical shock hazard.

Turn OFF power to furnace before any disassembly or servicing.

Failure to do so can result in property damage, injury and/or death.

Do not tamper with the unit or its controls. Call a qualified service technician.

Before calling for service, check the following :

a. Check oil tank gauge and check if the oil tank valve is open;
b. Check fuse or circuit breaker;
c. Check if shut-off switch is “ON”;
d. Reset thermostat above room temperature;
e. If ignition does not occur, turn off the disconnect switch and call a qualified service technician.

When ordering replacement parts, specify the complete furnace model number and serial number.

3.1.1) Heat exchanger cleaning

Ordinarily, it is not necessary to clean the heat exchanger or flue pipe every year, but it is advisable to have your oil burner serviceman check the unit before each heating season to determine whether cleaning or replacement of parts is necessary.

If cleaning is necessary, the following steps should be performed:

1. Turn “OFF” all utilities upstream of the furnace;
2. Disconnect the flue pipe;
3. Remove the flue collar plate located at the front of the furnace;
4. Remove the radiator baffles;
5. Disconnect the oil line and remove the oil burner from the furnace;
6. Clean the secondary tubes, and the primary cylinder with a stiff brush and a vacuum cleaner;
7. After cleaning, replace the radiator baffles, flue collar plate and oil burner;
8. Readjust burner for proper operation.

Soot will have collected in the first sections of the heat exchangers only if the burner was started after the combustion chamber was flooded with fuel oil, or if the burner has been operating in a severely contaminated condition.

3.1.2) Blower removal

To remove the blower from the furnace:

1. Turn “OFF” all utilities upstream of the furnace;
2. Remove the burner access door and blower door;
3. Remove the blower retaining screw (on the blower rail);
4. Remove the cover from the control box and disconnect the thermostat and power wires from the board;
5. Slide the blower toward the front of the unit;
6. Reverse the above steps to reinstall the blower. Refer to wiring diagram Figures (9 to 9.3) of this manual or the diagram located on the inside of the blower door to properly rewire the unit.

CAUTION

Be sure the blower is adequately supported when sliding it off the mounting rails, especially in the horizontal configuration, in order to prevent dropping the blower and injuring yourself and/or damaging the blower!

3.1.3) Burner drawer assembly

Remove the drawer assembly. Clean all foreign matter from the retention head and electrodes. In the case of a Beckett AFG burner, the burner will have to be removed to check the retention head.

3.1.4) Nozzle

Replace the nozzle with the one specified in Table 2.

3.1.5) Oil filter

Tank filter

The tank filter should be replaced as required.

Secondary filter

The 10 micron (or less) filter cartridge should be replaced annually.

3.1.6) Air filters

Air filters are the disposable type. Disposable filters should be replaced at least once a year. Dusty conditions, presence of animal hair etc. may require much more frequent filter changes. Dirty filters will impact on furnace efficiency and increase oil consumption.

3.1.7) Motor lubrication

Do NOT lubricate the oil burner motor or the direct drive blower motor as they are permanently lubricated.

3.1.8) Blocked Vent Shut Off (BVSO) Cleaning

For continued safe operation, the Blocked Vent Shut-Off System (BVSO) is required to be inspected and maintained annually by a qualified agency.

1. Disconnect the power to the appliance;
2. Remove the two screws holding on the BVSO assembly cover;
3. Remove the cover;
4. Remove the two screws holding the thermal switch to the assembly base;
5. Without removing the electrical wires, remove the thermal switch and remove any build-up from the thermal switch surface;

CAUTION

Do not dent or scratch the surface of the thermal switch. If the thermal switch is damaged, replacement is required.

6. Clear and remove any build-up or obstruction inside the heat transfer tube;
7. Re-mount the thermal switch to the assembly base;
8. Re-attach the assembly cover with the screws removed in step 2;
9. Re-establish power to the appliance.

PART 4
INFORMATION

Model: _____ Serial number: _____

Furnace installation date: _____

Service telephone - Day: _____ Night: _____

Dealer name and address: _____

_____

_____

START-UP TEST RESULTS

Nozzle: _____ Pressure: _____ lb/psi

Burner adjustments: Primary air _____

Fine air _____

Drawer Assembly _____

CO_2: _____ % Smoke scale: _____ (Bacharach)

Gross stack temperature: _____ °F

Ambient temperature: _____ °F

Chimney draft: _____ " W.C.

Overfire draft: _____ " W.C.

Test performed by: _____

TABLE 2
Technical Specifications

Model : NOMF	75	90	105	120	140	155
RATING AND PERFORMANCE						
Firing rate (USGPH)	0.50	0.65	0.75	0.85	1.00	1.10
Input (BTU/h)	70,000	91,000	105,000	119,000	140,000	154,000
Heating capacity (BTU/h)	57,000	74,000	85,000	97,000	115,000	126,000
AFUE %	80			80		
Heating temperature rise	13°C - 29°C (55F - 85°F)			13°C - 29°C (55°F - 85°F)		
Flue draft minimum (W.C.)	-0.06" to -0.025"			-0.06" to -0.025"		
Overfire pressure draft (W.C.)	range +0.010" to +0.025"			max +0.025"		
BECKETT BURNER; MODEL AFG (3450 rpm)	**AFG-F3**			**AFG-F3**		**AFG-F6**
Low firing rate baffle	YES			YES		YES
Static disc, model	3 3/8" # 31646			2 3/4" # 3383		2 3/4" # 338
Nozzle (Delavan)	0.50 - 70W	0.55 - 70B	0.65 - 70B	0.75 - 70B	0.85 - 70B	0.85 - 70B
Pump pressure (PSIG)	100	140	130	130	140	170
Combustion air adjustment (shutter/band)	0 / 5	0 / 7	0 / 8	1 / 8	4 / 4	2 / 8
RIELLO BURNER, MODEL 40	**F3 TUBE INSERTION 3 9/16**			**F5 TUBE INSERTION 3 9/16**		
Nozzle (Delavan)	0.40 - 70A	0.50 - 70W	0.65 - 70W	0.75 - 70B	0.85 - 70W	1.00 - 70W
Pump pressure (PSIG)	160	170	135	130	140	125
Combustion air adjustment (turbulator / damper)	0 / 3	0 / 3.5	0 / 4	0 / 3	0 / 3.5	0 / 4
ELECTRICAL SYSTEM						
Volts - Hertz - Phase	115 - 60 - 1			115-60-1		
Operating voltage range (volts)	104 - 132			104 - 132		
Electrical load (Amps)	12.2			15.7		
Minimum ampacity for wiring sizing	13.7			18.1		
Max. wire lenght	26'			26'		
Max. fuse size (Amps)	15			20		
Control transformer	40 VA			40 VA		
External control power available Heating	40 VA			40 VA		
Cooling	30 VA			30 VA		
BLOWER DATA						
Blower speep at 0.5" W.C. static pressure	MED-LOW	MED-HIGH	HIGH	MED-LOW	MED-HIGH	HIGH
Motor / number of speeds	1/3 HP / 4			3/4 HP / 4		
Blower wheel size	10" x 10"			12" x 10"		
GENERAL INFORMATION						
Overall dimension (width x depth x height)	20" x 35" x 48.75"			20" x 39.50" x 53"		
Supply air opening	18.625" x 20"			19" x 24"		
Return air opening	15" x 23"			17" x 29"		
Filter size	16" x 24"			18" x 30"		
Shipping weight	100 Kg / 221 lbs			122 Kg / 270 lbs		

TABLE 2.1
Air delivery (CFM)

SPEED	NOMF105 / 106 - EXTERNAL STATIC PRESSURE WITH AIR FILTER 0.2" (W.C.)	0.3" (W.C.)	0.4" (W.C.)	0.5" (W.C.)
HIGH	1,425	1,350	1,305	1,250
MED-HIGH	1,130	1,045	1,000	950
MED-LOW	840	810	770	740
SPEED	**NOMF155 / 156 - EXTERNAL STATIC PRESSURE WITH AIR FILTER** 0.2" (W.C.)	0.3" (W.C.)	0.4" (W.C.)	0.5" (W.C.)
HIGH	2,080	2,041	1,965	1,864
MED-HIGH	1,892	1,859	1,770	1,675
MED-LOW	1,556	1,475	1,394	1,318

FIGURE 9

Wiring diagram - NOMF105D12C - Beckett burner

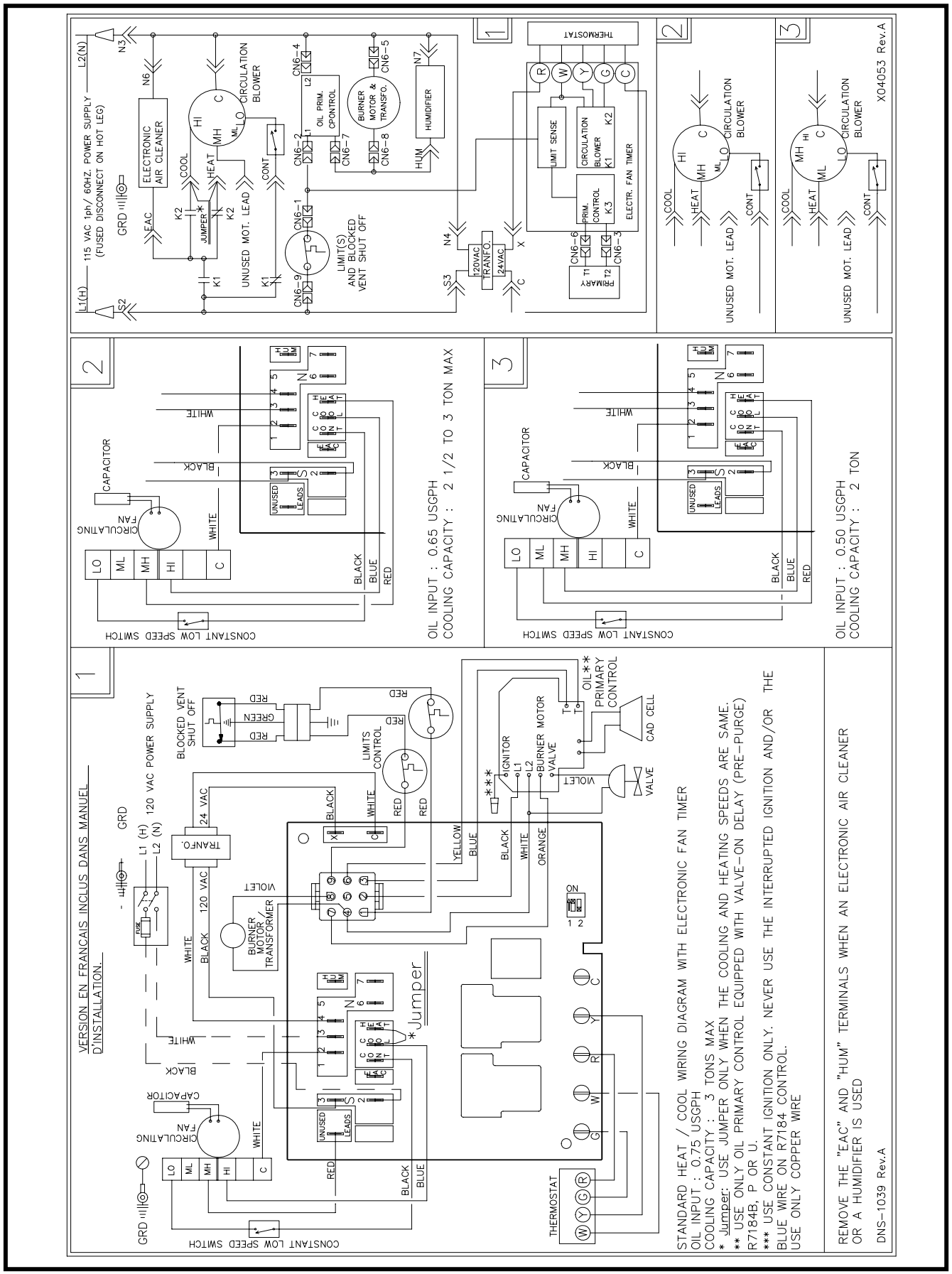


FIGURE 9.1

Wiring diagram - NOMF155E19C - Beckett burner

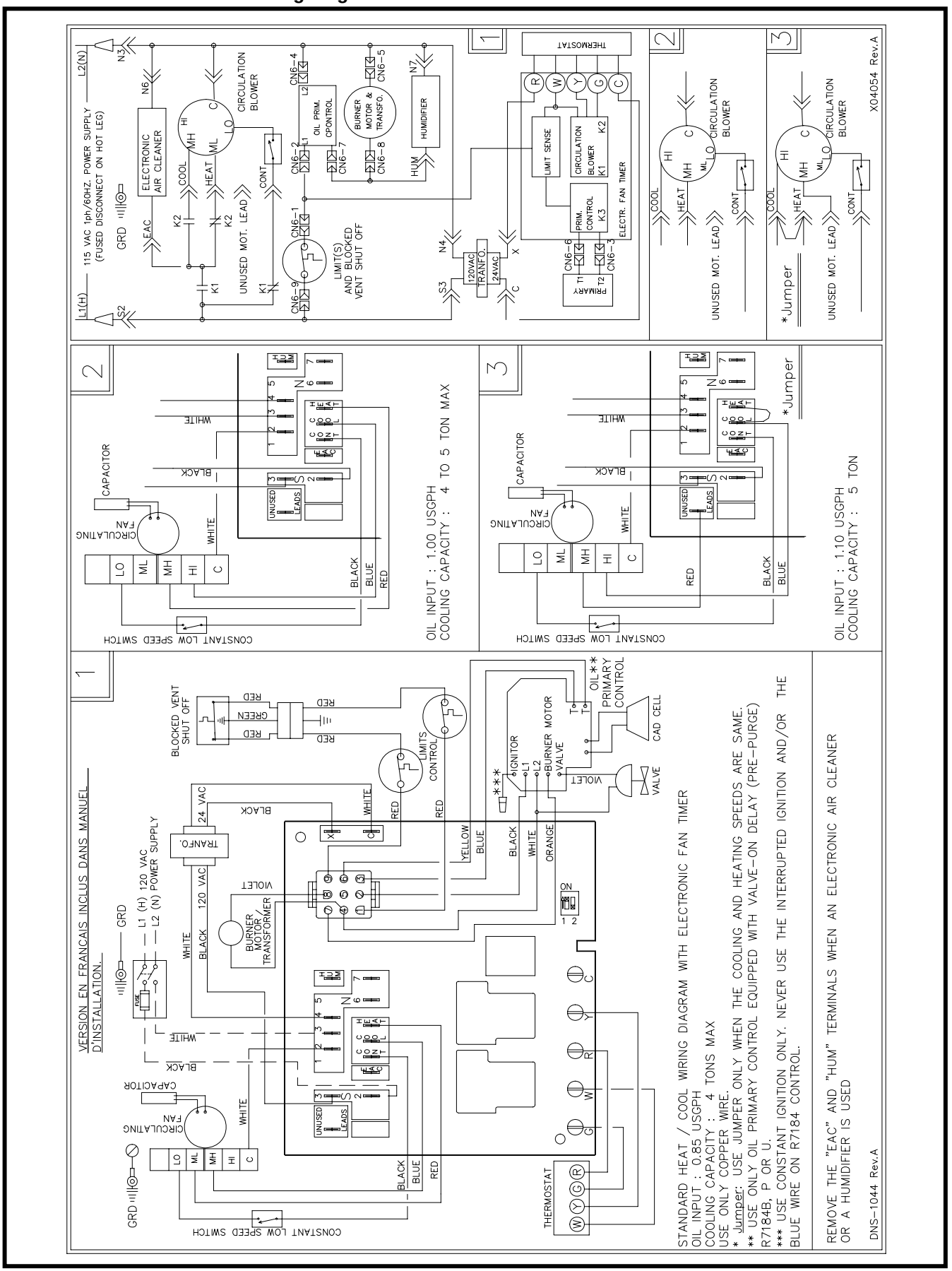


FIGURE 9.2

Wiring diagram - NOMF106D12B - Riello burner

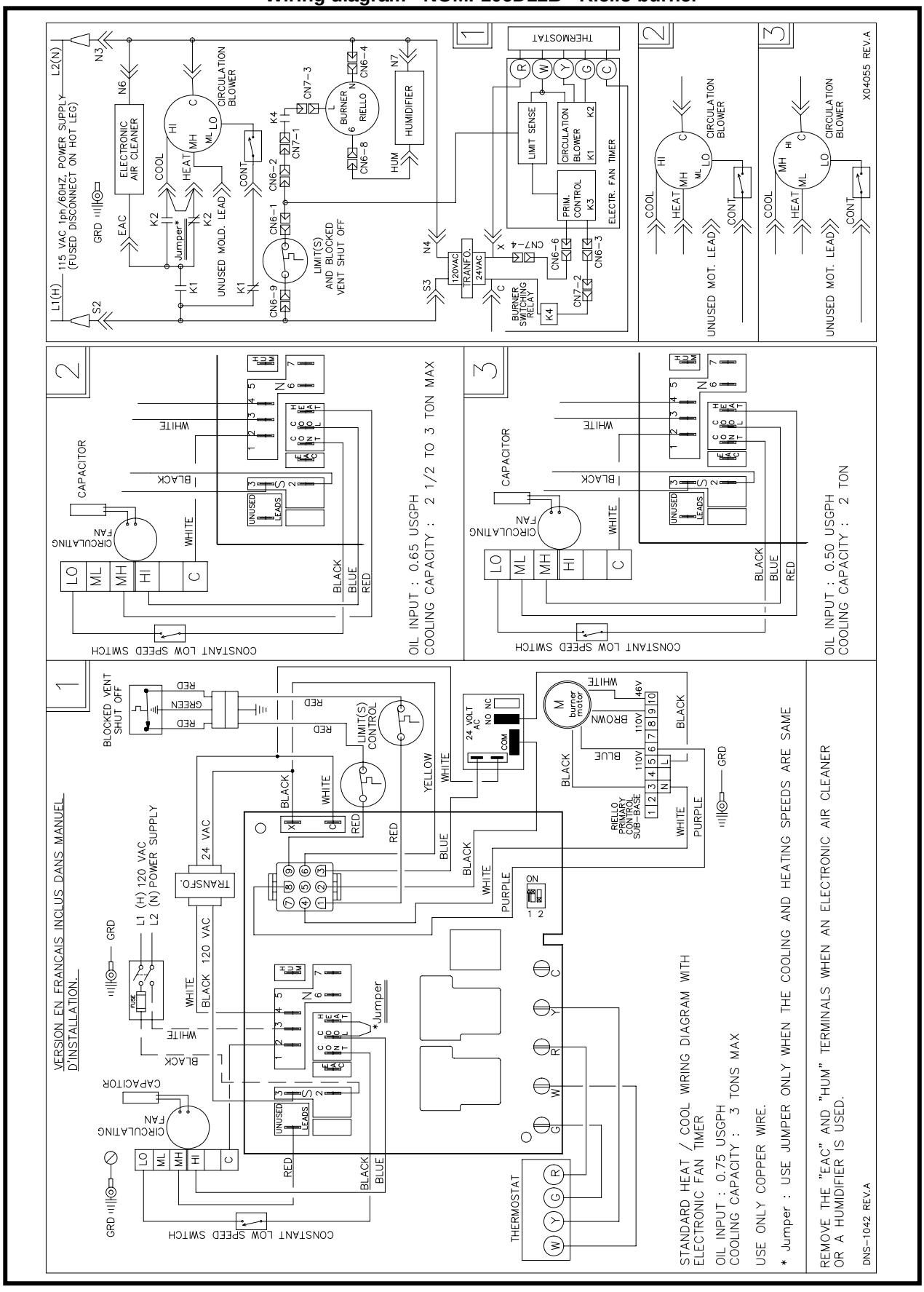


FIGURE 9.3

Wiring diagram - NOMF156E19B - Riello burner

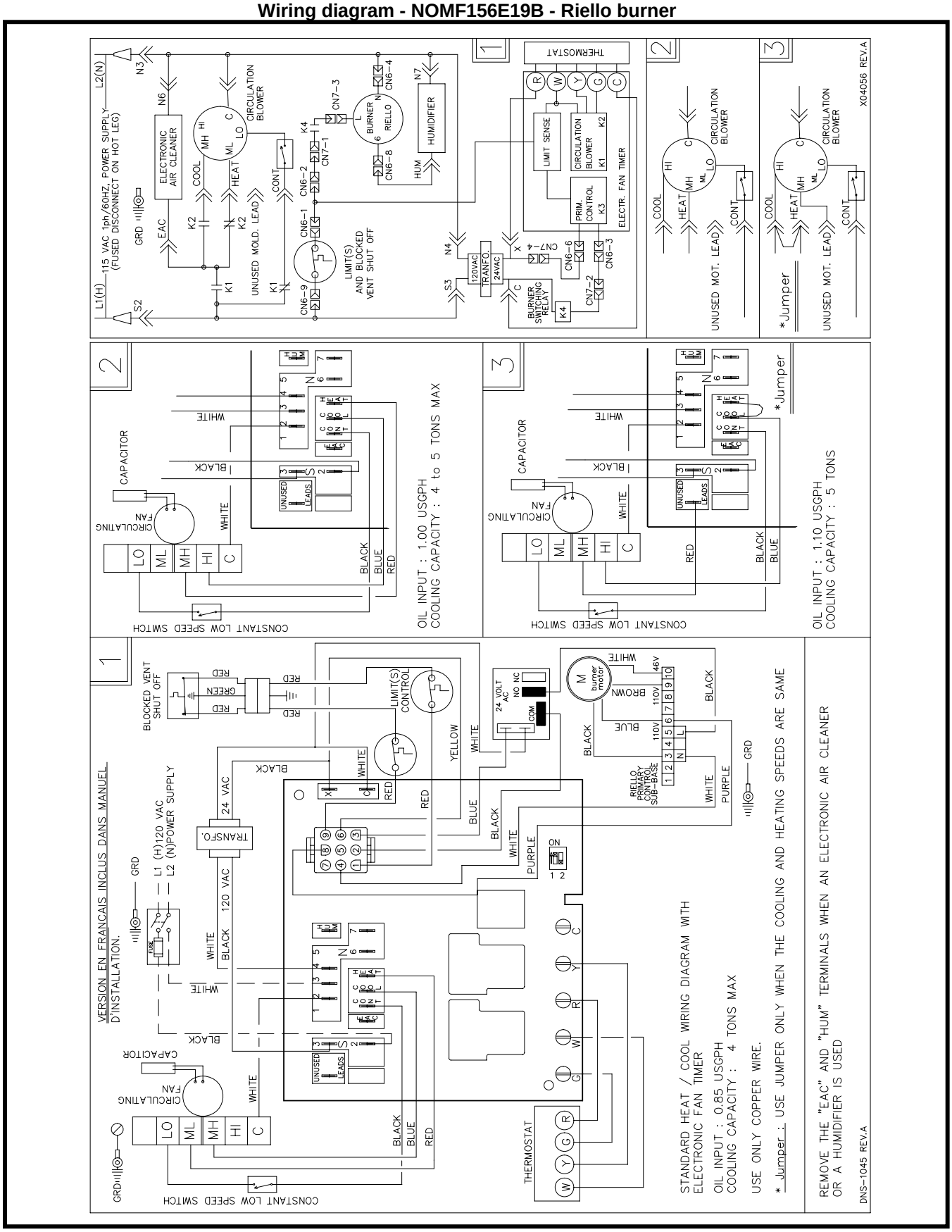


FIGURE 10
Model: NOMF105 / 106

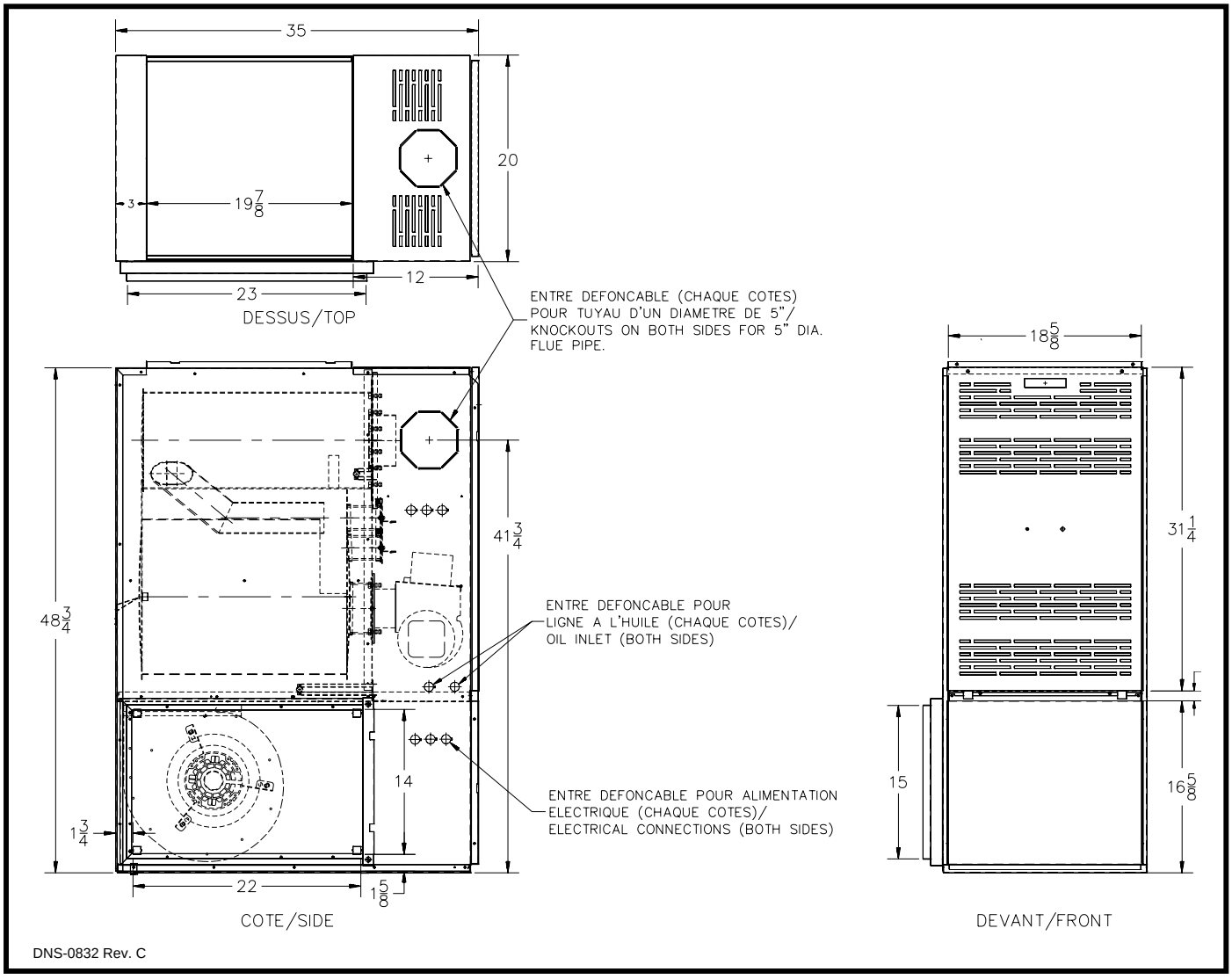


TABLE 3
Minimum clearances to combustible materials - MODEL: NOMF105 / 106

LOCATION	APPLICATION	UPFLOW	DOWNFLOW	HORIZONTAL
SIDE	FURNACE	0"	2"	2"
	SUPPLY PLENUM WITHIN 6 FEET OF FURNACE	1"	2"	1"
BACK	FURNACE	0"	1"	0"
TOP	FURNACE OR PLENUM	2"	2"	2"
	HORIZONTAL WARM AIR DUCT WITHING 6 FEET OF FURNACE	2"	2"	3"
BOTTOM	FURNACE (COMBUSTIBLE FLOOR WITH SUB-BASE*)	0"	0" *	0" *
FLUE PIPE	HORIZONTALLY OR BELOW FLUE PIPE	4"	4"	4"
	VERTICALLY ABOVE FLUE PIPE	9"	9"	9"
FRONT	FURNACE	8"	8"	24"

* If used with Sub-Base DFB-101 or HFB-101 respectively

FIGURE 10.1
Model: NOMF155 / 156

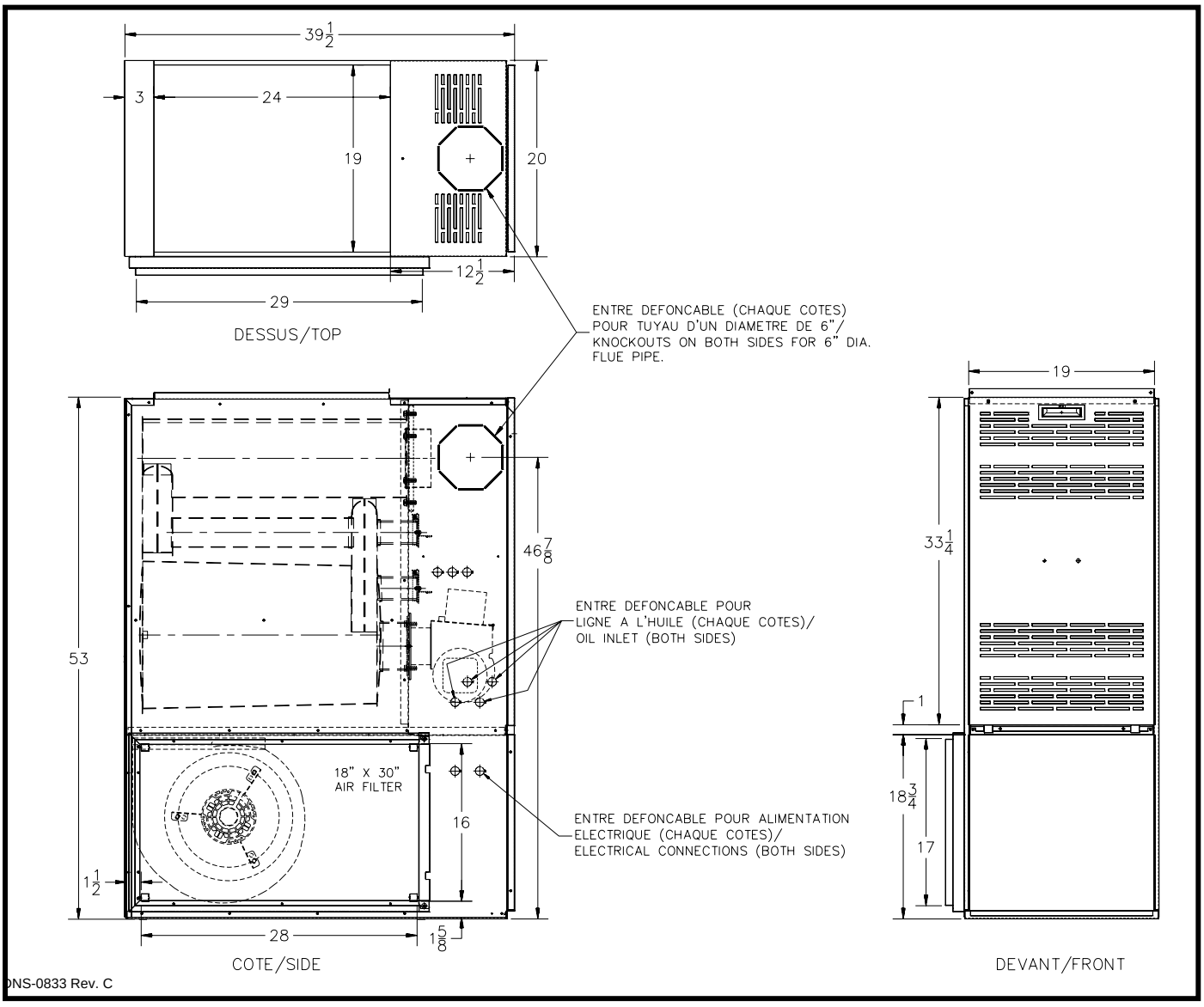
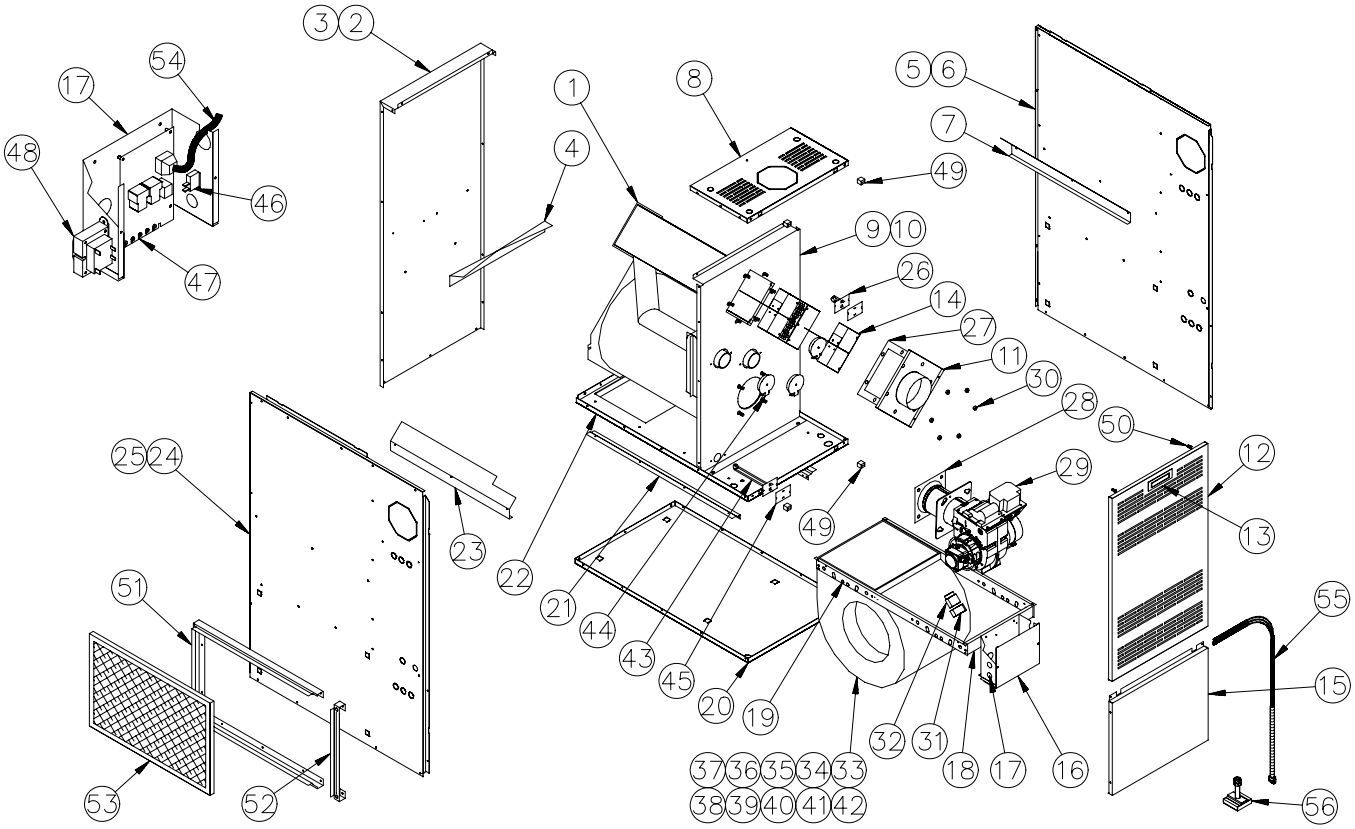


TABLEAU 3.1
Minimum clearances to combustible materials - MODEL: NOMF155 / 156

LOCATION	APPLICATION	UPFLOW	DOWNFLOW	HORIZONTAL
SIDE	FURNACE	1"	2"	2"
	SUPPLY PLENUM WITHIN 6 FEET OF FURNACE	1"	2"	1"
BACK	FURNACE	0"	1"	0"
TOP	FURNACE OR PLENUM	2"	2"	2"
	HORIZONTAL WARM AIR DUCT WITHING 6 FEET OF FURNACE	2"	2"	3"
BOTTOM	FURNACE (COMBUSTIBLE FLOOR WITH SUB-BASE)	0"	0" *	0" *
FLUE PIPE	HORIZONTALLY OR BELOW FLUE PIPE	4"	4"	4"
	VERTICALLY ABOVE FLUE PIPE	9"	9"	9"
FRONT	FURNACE	8"	8"	24"

* If used with Sub-Base DFB-101 or HFB-101 respectively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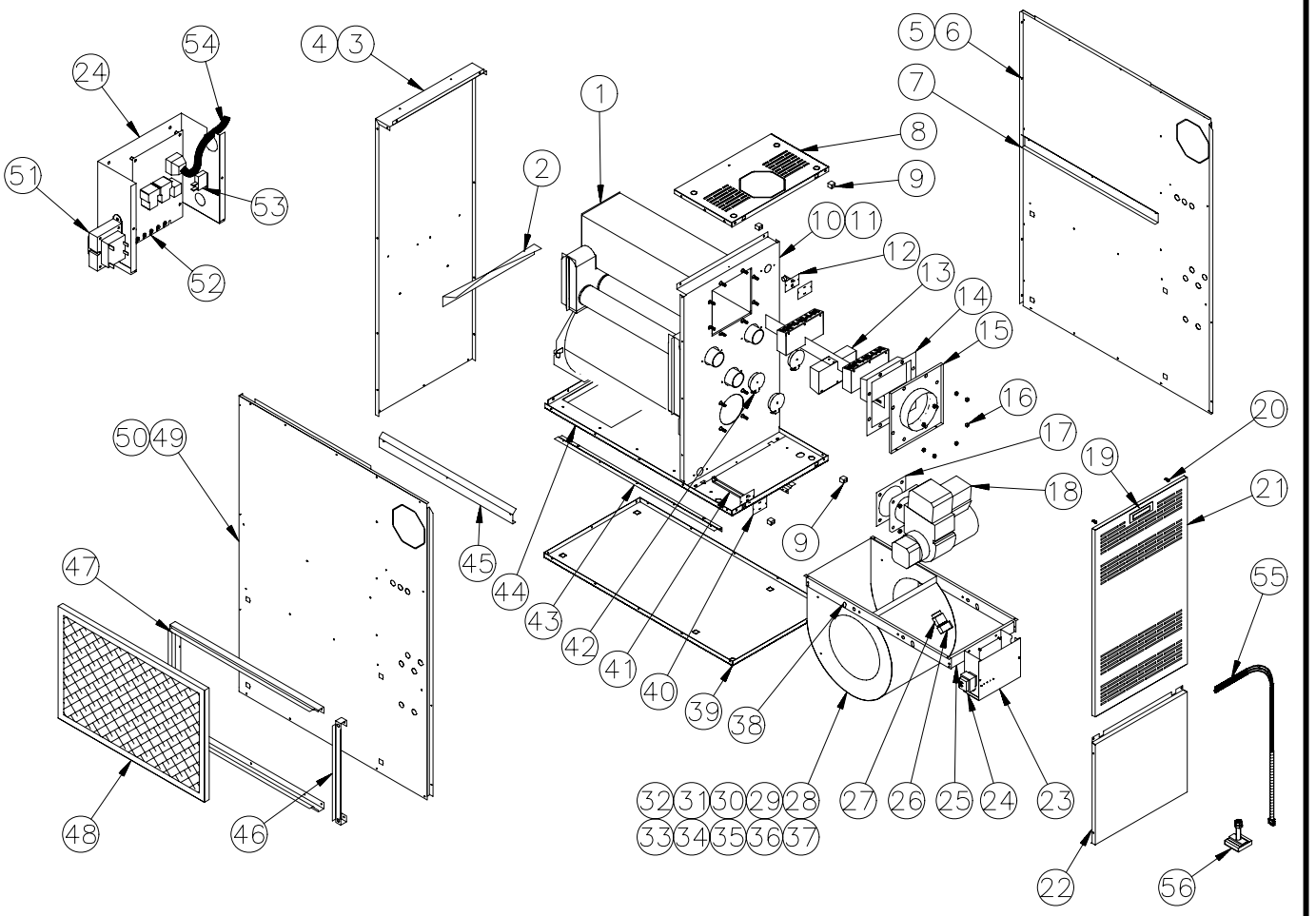
PARTS LIST
Model : NOMF105D12C & NOMF106D12B

ITEM	DESCRIPTION	PART #	COMMENTS
1	HEAT EXCHANGER	B01667	
2	REAR PANEL ASSEMBLY	B01728	PANEL, INSULATION AND BAFFLE INCLUDED
3	INSULATION, REAR PANEL	B01986	
4	REAR BAFFLE	B01898	
5	RIGHT SIDE PANEL ASSEMBLY	B01885-01	PANEL, INSULATION AND BAFFLE INCLUDED
6	INSULATION, SIDE PANEL	B01645-01	
7	RIGHT LATERAL BAFLLE	B01679-01	
8	FRONT TOP PANEL ASSEMBLY	B01861	PANEL AND LATCHES INCLUDED
9	FRONT DIVIDER PANEL ASSMEBLY	B01727	PANEL, INSULATION AND LABELS INCLUDED
10	INSULATION, FRONT PANEL	B01646	
11	SMOKE BOX	B01697	
12	FRONT DOOR ASSEMBLY	B40011-06	DOOR, LATCH AND HANDLE INCLUDED
13	RECESSED HANDLE, BLACK	Z99F050	
14	BAFFLE ASSEMBLY	B01676	BAFFLES AND INSULATION INCLUDED
15	BLOWER DOOR ASSEMBLY	B01883-05	DOOR AND LABELS INCLUDED
16	ELECTRICAL BOX COVER	B01684	
17	ELECTRICAL BOX	B01683	BOX ONLY
18	ELECTRICAL BOX SUPPORT	B01682	
19	BLOWER RAIL	B01681	2 REQUIRED
20	FLOOR	B01687	
21	BLOWER RAIL	B01680	2 REQUIRED
22	BLOWER DIVIDER	B01846	PANEL ONLY
23	LEFT LATERAL BAFFLE	B01679-02	
24	LEFT SIDE PANEL ASSEMBLY	B01885-02	PANEL, INSULATION AND BAFFLE INCLUDED
25	INSULATION, SIDE PANEL	B01645-02	
26	HIGH LIMIT 195-30F	R02R003	
27	GASKET, SMOKE BOX COVER	B01214	
28	GASKET, FIXED BREECH, BECKETT	N04Z026	
29A	BURNER ASSEMBLY	B03091-01	
29B	BURNER, RIELLO 40 F3	N01F011	
30	HEXAGONAL FLANGE NUT 3/8-16NC BRASS	F07O001	
31	CAPACITOR HOLDER	B01024	
32	CAPACITOR 5 MF	L01I001	
33	MOTOR SUPPORT ASSEMBLY 1/3 HP	B01890-01	MOTOR AND LEGS INCLUDED
34A	REPLACEMENT BLOWER ASSEMBLY	B01405-01	MOTOR , BLOWER AND CAPACITOR INCLUDED
34B	BLOWER GT10-10DD	Z01I004	BLOWER WHEEL AND HOUSING INCLUDED
35	BLOWER WHEEL GT10-10DD	Z01L002	
36	MOTOR SUPPORT, TRIANGLE BAND	Z01F012	
37	MOTOR SUPPORT, TRIANGLE LEG	Z01F013	3 REQUIRED
38	SCREW, #F HEX WASHER, 1/4-20 x 1 1/4	F03F023	3 REQUIRED
39	WASHER, 1/4" BOLT ZINC BB	F06F010	3 REQUIRED
40	HEX LOCKNUT "K-LOCK" 1/4-20NC	F07J001	
41	HEX BOLT 1/4-20 x 1 1/2 ZINC FULL THREAD	F05F015	
42	BELLY BAND ASSEMBLY	B01888	
43	HIGH LIMIT 140F, 7" STEM	R02R002	
44	OBSERVATION DOOR	B02111	
45	ELECTRICAL INSULATING BARRIER	A00284	
46	ROCKER SWITCH, SPST	L07F003	
47	ELECTRONIC BOARD	R99G002	
48	TRANSFORMER 120V-24Volts, 40VA	L01F009	
49	LATCH ASSEMBLY, FEMALE	Z99F003	
50	LATCH ASSEMBLY, MALE	Z99F038	
51	FILTER RACK FRAME	B01695	
52	FILTER RACK ACCESS	B01696	
53	PAPER FILTER 16" x 24" x 1"	Z04F007	
54	ELECTRICAL KIT	B00203	
55	BVSO ELECTRICAL KIT	B03341-01	
56	BLOCKED VENT SHUT-OFF BVSO-225	Z06G001	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PARTS LIST
Model : NOMF155E19C & NOMF156E19B

ITEM	DESCRIPTION	PART #	COMMENTS
1	HEAT EXCHANGER	B01787	
2	REAR BAFFLE	B01988	
3	REAR PANEL ASSEMBLY	B01877	PANEL, INSULATION AND BAFFLE INCLUDED
4	INSULATION, REAR PANEL	B01987	
5	PANEL ASSEMBLY, RIGHT SIDE	B01875-01	PANEL, INSULATION AND BAFFLE INCLUDED
6	INSULATION, SIDE PANEL	B01800-01	
7	TOP LATERAL DEFLECTOR	B01805-01	
8	FRONT TOP PANEL ASSEMBLY	B01874	PANEL AND LATCHES INCLUDED
9	LATCH ASSEMBLY, FEMALE	Z99F003	
10	FRONT DIVIDER PANEL ASSMEBLY	B01878	PANEL, INSULATION AND BAFFLE INCLUDED
11	INSULATION, FRONT DIVIDER	B01853	
12	HIGH LIMIT 175-20F 1.75	R02R005	
13	BAFFLE ASSEMBLY	B01751	
14	GASKET, SMOKE BOX COVER	B00205	
15	SMOKE BOX	B01747	
16	HEXAGONAL FLANGE NUT 3/8-16NC BRASS	F07O001	
17	GARNITURE, BRIDE FIXE BECKETT	N04Z026	
18A	BURNER ASSEMBLY	B03092-01	
18B	RIELLO BURNER 40F5 VSBT	N01F012	
19	RECESSED HANDLE, BLACK	Z99F050	
20	LATCH ASSEMBLY, MALE	Z99F038	
21	FRONT DOOR ASSEMBLY	B40014-06	DOOR, LATCH AND HANDLE INCLUDED
22	BLOWER DOOR ASSEMBLY	B01873-05	
23	ELECTRICAL BOX COVER	B01684	
24	ELECTRICAL BOX	B01683	BOX ONLY
25	ELECTRICAL BOX SUPPORT	B01682	
26	CAPACITOR HOLDER	B01024	
27	CAPACITOR 15 MF	L01I005	
28	MOTOR 3/4 DD 4V	L06I004	
29A	REPLACEMENT BLOWER ASSEMBLY	B01406-01	MOTOR , BLOWER AND CAPACITOR INCLUDED
29B	BLOWER GT12-10DD	Z01I008	BLOWER WHEEL AND HOUSING INCLUDED
30	BLOWER WHEEL G12-10DD	Z01L003	
31	MOTOR SUPPORT, TRIANGLE BAND	Z01F012	
32	MOTOR SUPPORT, TRIANGLE LEG	Z01I017	
33	SCREW, #F HEX WASHER, 1/4-20 x 1 1/4	F03F023	3 REQUIRED
34	WASHER, 1/4" BOLT ZINC	F06F010	3 REQUIRED
35	HEX LOCKNUT "K-LOCK" 1/4-20NC	F07J001	3 REQUIRED
36	HEX BOLT 1/4-20 x 1 1/2 ZINC FULL THREAD	F05F015	
37	BELLY BAND ASSEMBLY	B01889	
38	BLOWER RAIL	B01681	
39	FLOOR	B01804	
40	ELECTRICAL INSULATING BARRIER	A00284	
41	HIGH LIMIT 140F, 7" STEM	R02R002	
42	OBSERVATION DOOR	B02111	
43	BLOWER RAIL	B01794	
44	BLOWER DIVIDER	B01795	PANEL ONLY
45	BOTTOM LATERAL DEFLECTOR	B01805-02	
46	FILTER RACK ACCESS	B01808	
47	FILTER RACK FRAME	B01809	
48	PAPER FILTER 20" x 30" x 1"	Z04F013	
49	LEFT SIDE PANEL ASSEMBLY	B01875-02	PANEL, INSULATION AND BAFFLE INCLUDED
50	INSULATION, LEFT SIDE PANEL	B01800-02	
51	TRANSFORMER 120-24Volts, 40VA	L01F009	
52	ELECTRONIC BOARD	R99G002	
53	ROCKER SWITCH, SPST	L07F003	
54	ELECTRICAL KIT	B00203	
55	BVSO ELECTRICAL KIT	B03341-01	
56	BLOCKED VENT SHUT-OFF BVSO-225	Z06G001	