

INSTALLATION INSTRUCTIONS AND HOMEOWNER'S MANUAL: ELECTRIC FURNACE



ADVANTAGE

(ECM MOTOR)

MULTI-POSITION



Models:

SUPXX-A240V12

SUPXX-A240V20



INSTALLER / SERVICE TECHNICIAN:

USE THE INFORMATION IN THIS MANUAL FOR THE INSTALLATION AND 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.

Attention:

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

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

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1 SAFETY

1.1 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 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.

a) It is the homeowner's responsibility to engage a qualified


technician for the installation and subsequent servicing of this furnace;

- b) 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;
- c) Do not store gasoline or any other flammable substances, such as paper or carton, near the furnace;
- d) Never block or otherwise obstruct the filter and/or return air openings;
- e) Ask the technician installing your furnace to show and explain to you the following items:
 - i. The main disconnect switch or circuit breaker;
 - ii. The air filter and how to change it (check monthly and clean or replace if necessary);
- f) Before calling for service, be sure to have the information of section 5 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.

IMPORTANT: All local and national code requirements governing the installation of central electric heating equipment, wiring and the flue connection **MUST** be followed. Some of the codes that may apply are:
ANSI/NFPA 70: National Electrical Code **CSA C22.1** or **CSA C22.10:** Canadian Electrical Code Only the latest issues of these codes may be used, and are available from either:

The National Fire Protection Agency
1 Batterymarch Park
Quincy, MA 02269
or
The Canadian Standards Association
178 Rexdale Blvd.
Rexdale, Ontario M9W 1R3

1.3 DANGER OF FREEZING

 **CAUTION**
If your furnace is shut down during the cold weather season, water pipes may freeze, burst and cause serious water damage. Turn off the water supply and bleed the pipes.

If the heater is left unattended during the cold weather season, take the following precautions:

- a) Close the main water valve in the house and purge the pipes if possible. Open all the faucets in the house;
- b) Ask someone to frequently check the house during the cold weather season to make sure that there is sufficient heat to prevent the pipes from freezing. Tell this person to call an emergency number if required.

2 INSTALLATION

This furnace is a true multi-position unit, in that it will function in an upflow, downflow or horizontal configuration to the left or the right. Only a few modifications are required during installation to change from one position to another. The unit is shipped in the upflow configuration and instructions as to how to change to the other positions are included in this manual.

The unit requires a 120/240 - 208 VAC power supply to the control panel, thermostat hook-up as shown on the wiring diagram.

2.1 POSITIONING THE FURNACE

! WARNING

FIRE AND EXPLOSION HAZARD

The furnace must be installed in a level position, never where it will slope toward the front. Do not store or use gasoline or any other flammable substances near the furnace. Non-observance of these instructions will potentially result in death, bodily injury and/or property damage.

! WARNING

This furnace is not watertight and is not designed for outdoor installation. It must be installed in such a manner as to protect its electrical components from water. Outdoor installation will lead to a hazardous electrical condition and to premature failure of the equipment.

If the furnace is installed in a basement or on a dirt floor, in a crawl space for example, it is recommended to install the unit on a cement base 2.5 cm to 5.0 cm (1" to 2") thick.

In addition, the heater should also be located close to the center of the air distribution system.

2.2 CLEARANCES TO COMBUSTIBLE MATERIAL

2.2.1 Heating unit

The furnace is approved for zero clearance to combustible material regardless of the heating capacity.

2.2.2 Supply air ducts

Ducts can be installed with a zero clearance to combustible material.

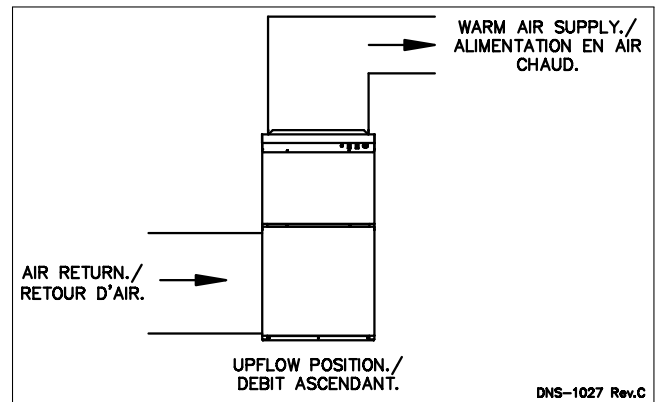
2.3 CONFIGURATIONS

This furnace requires suitable ductwork.

2.3.1 Upflow installation

The return duct may be installed to the back, to the bottom, on the left side or on the right side of the unit. The supply duct shall be installed on the top of the unit. Care should be taken not to damage the wires inside, while cutting the opening. Install the filter rack that is supplied with the unit. It is also recommended to install the blower door before handling or moving the unit. Refer to Figure 1 for additional details.

Figure 1: Upflow Configuration

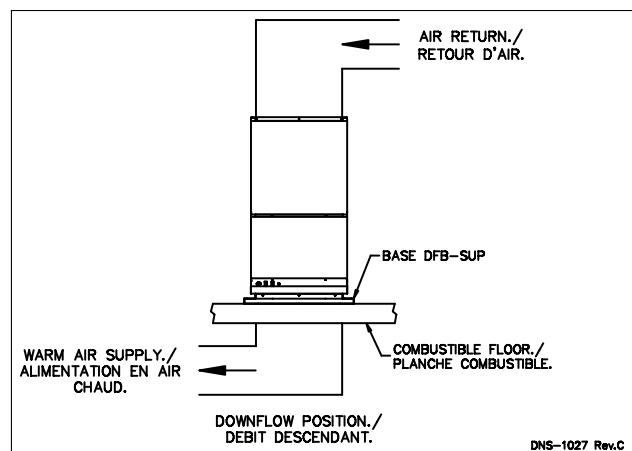


2.3.2 Downflow installation

The return duct may be installed to the back, on the left side, on the right side or under the unit. The supply duct shall be installed on the top of the unit.

When the furnace is installed in the downflow position on a combustible floor, the downflow base DFB-SUP can be used. Refer to Figure 2 and the installation instructions provided with the base.

Figure 2: Downflow Configuration

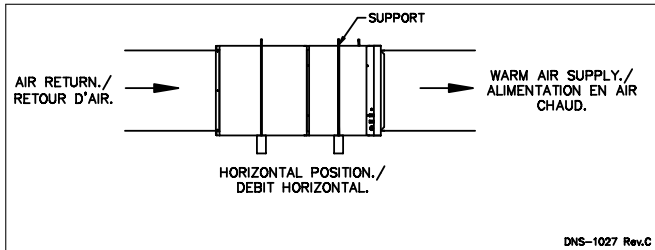


2.3.3 Horizontal installation

The return duct may be installed to the back, on the left side, on the right side or under the unit. The supply duct shall be installed on the top of the unit.

When the furnace is installed in the horizontal position, either suspended or on a combustible floor with a choice of right or left discharge, the clearances from combustible material must be adhered to. Refer to Figure 3 for additional details.

Figure 3: Horizontal Configuration



2.3.4 Suspended installation

The furnace can be hung to the ceiling in either upflow, downflow or horizontal. Make sure to mount it appropriately and to respect the clearances to combustible material.

! WARNING

The furnace must be properly secured especially when installed above living space. Failure to follow this rule can result in death, bodily injury and/or property damage.

2.4 ELECTRICAL SYSTEM

The SUPREME furnace is completely pre-wired and all field wiring must be connected to the terminal blocks on the unit. It requires 2 service wires of 120/240 - 208 volts.

! WARNING

RISK OF FIRE
The conductor sizing must conform to the last edition of the local or national codes. Failure to follow this rule can result in death, bodily injury and/or property damage.

Power supply to the unit can be done using copper or aluminum wires. The wire size must be decided in accordance to unit power consumption, the over current protection type and capacity, the wire type and length, and the environment where the unit is installed. If an aluminum wire is used, other precautions must be taken to insure the conformity of the installation. In all cases, all the factors affecting the wire gauge must be considered

and the installation codes followed.

The exterior of the unit must have an uninterrupted ground to minimize the risk of bodily harm. A ground terminal is supplied with the control box for that purpose. A connector is supplied on the ground terminal to ground an added accessory.

In the event that wires inside the unit require replacement, these must be copper wires only with same temperature rating and sizes as originals.

2.4.1 Conversion from two wires to one wire supply for models starting with SUP27 or SUP30

! WARNING

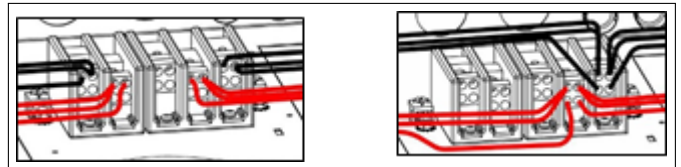
RISK OF FIRE

When using one terminal block on models starting with SUP27 or SUP30, the installation must be performed with copper wire ONLY in order to comply with the Canadian electrical code. The usage of an aluminum or copper wire is acceptable on models 25kW and lower.

Move all wires from the two pole terminal to the three pole terminal following the corresponding colors as shown in Figure 4.

The breaker and the supply conductors must be sized by adding the ampacities of the two terminals indicated on the nameplate. Refer to the electrical diagram Figure 16.

Figure 4: Conversion from two to one supply wires



2.5 INSTALLATION OF THE THERMOSTAT

A thermostat must be installed to control the temperature of the area to be heated. Follow the instructions supplied with the thermostat. Some thermostats need to connect the C terminal on the furnace and thermostat. Install the thermostat on an interior wall in a location where it will not be subject to direct sunlight, lamps, air diffusers, fireplaces, etc. Seal openings in walls to avoid air currents that may influence the operation of the thermostat. Also refer to the wiring diagrams provided with the heating/air conditioning unit. The connections must be made as indicated on Figure 5 to Figure 9. Refer to the electrical diagram (Figure 16).

Figure 5: 1-stage thermostat, electric heating only

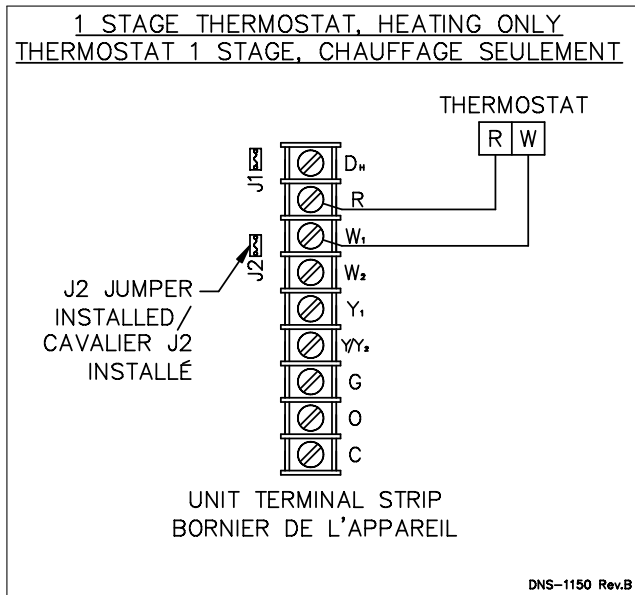


Figure 6: 2-stage thermostat, electric heating only

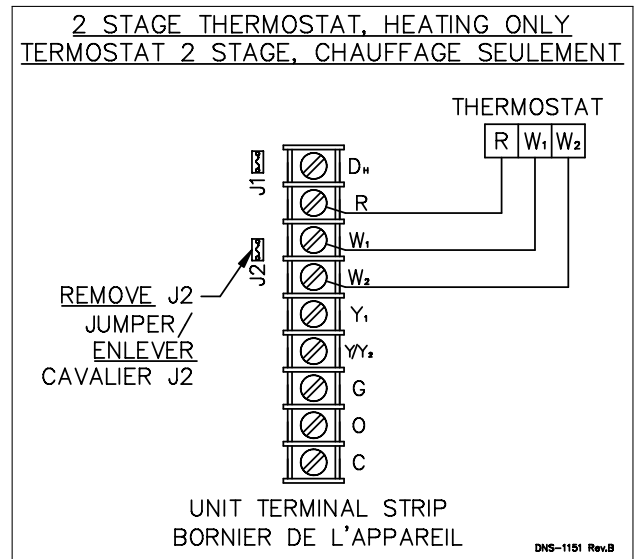


Figure 7: 1-stage thermostat electric heat and cooling application

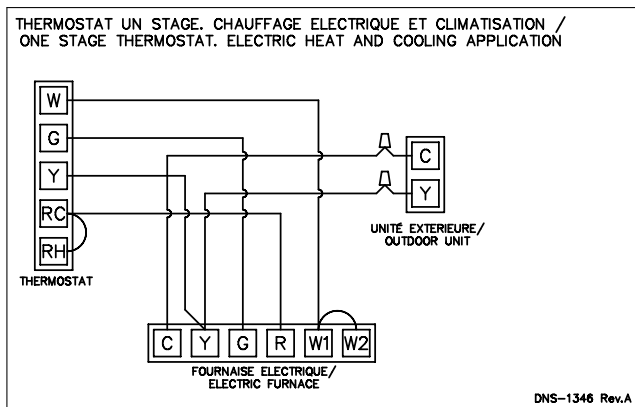


Figure 8: 2-stage heating & 1-stage air conditioning & heat pump thermostat

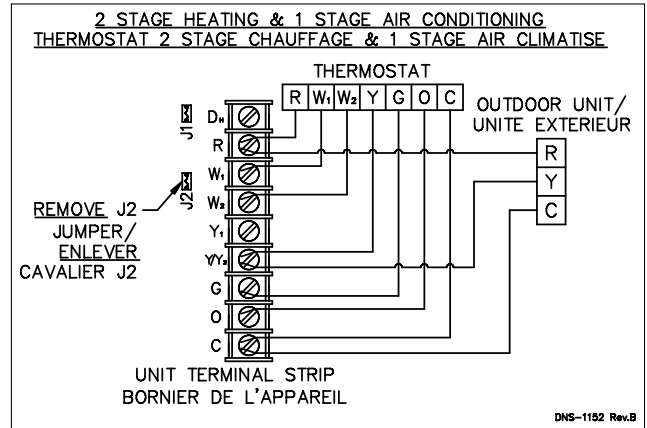
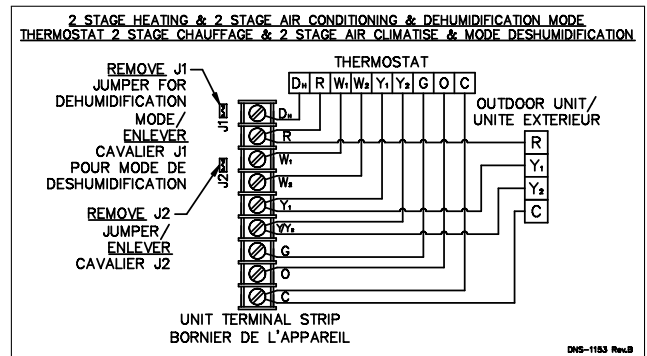


Figure 9: 2-stage heating & 2-stage air conditioning & heat pump thermostat + dehumidification mode



2.5.1 Anticipator adjustment (if required) on thermostat equipped with heat anticipator adjustment

Some thermostats are equipped with a heat anticipator that must be adjusted according to the instructions supplied. This is to ensure that the heating mode is comfortable and economical. Generally speaking, on a single stage thermostat, a reading of the current must be taken with an ammeter as follows:

1. Move the anticipator to its highest setting, rendering it ineffective.
2. Remove the wire from the W1 terminal of the furnace and connect an ammeter between the terminal and the wire.
3. Call for heat by raising the set point on the thermostat and allow the furnace to run for 3 to 4 minutes to reach its peak output.
4. Once the current has stabilized, a reading should be taken and the anticipator adjusted to that value. If longer heating cycles are desired, the anticipator can be set to a higher value

2.5.2 Air ducts

The ducts must be sized such a way as to accommodate the specified airflow and the available static pressure. Refer to the applicable local and/or national installation

codes. Insulate the ducts that lead through non-heated areas. Use flexible supply and return air connectors to avoid the transmission of vibration. To make the unit run even quieter, the installer should:

1. Use two elbows between each outlet and the supply and return air plenum;
2. Cover the vertical sections of the supply and return air duct with soundproofing material;
3. Use baffles in short radius elbows;
4. Use flexible hangers to suspend the ducts.

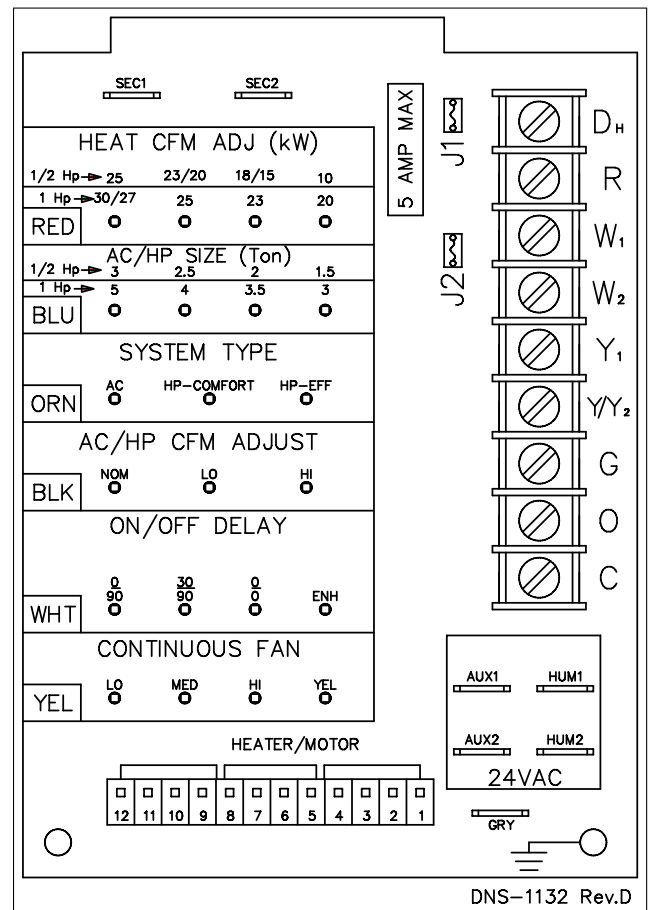
A heat pump or an air conditioner can be added to this furnace, in either the supply or return air duct. Carefully follow the instructions provided with these appliances to ensure proper installation and hook-up to the electric furnace. Refrigerant and drainage pipes must in no way hinder access to the furnace panels.

2.6 SUPPLY AIR ADJUSTMENTS

Fan Control Board taps are used by the installer to configure a system. The ECM motor uses the selected taps to modify its operation to a pre-programmed table of airflows (Refer to Table 3 and Table 4). Airflows are based on system size or mode of operation and those airflows are modified in response to thermostat inputs such as dehumidification request.

The electric furnace must be configured to operate properly with system components with which it is installed. To successfully configure a system (see information printed on circuit board label located next to select pins), move the 6 select wires to the pins which match the components used. (Refer to Figure 10)

Figure 10: Fan control board



2.6.1 HEAT KW/CFM adjustment

Installer must verify (factory set) the electric heat airflow adjustment required for kW size heater installed.

The select pins are marked 25, 23/20, 18/15, 10 (for 1/2 HP ECM motor unit) and 30/27, 25, 23, 20, (for 1.0 HP ECM motor unit). Refer to the unit wiring diagram and select the pin for the kW size heater being used (Refer to Figure 10 and Figure 16).

The airflow must be large enough for safe and continuous operation. (Refer to Table 3 and 4 for airflow delivery CFM).

2.6.2 AC/HP size

Select System Size Installed

The factory setting for air conditioner or heat pump size is the largest outdoor unit that can be used with the furnace. Installer needs to select air conditioner or heat pump size to ensure that airflow delivered falls within proper range for the size unit installed.

The select pins are marked 3, 2 1/2, 2, 1 1/2 for furnace equipped with 1/2 HP ECM motor and 5, 4, 3 1/2, 3 for furnace equipped with 1.0 HP ECM motor. Refer to the unit wiring diagram and select the pin for the outdoor unit size being used (Refer to Figure 10 and Figure 16).

2.6.3 System type

Select System Type Installed AC or HP

The type of system must be selected:

1. **AC** – Air Conditioner provides approximately 400 CFM per ton for greater efficiency and humidity control with the AC/HP CFM ADJUST set to the nominal (NOM) tap. To achieve more or less than 400 CFM per ton, move tap to (HI) or (LO) position respectively. Refer to appropriate airflow tables for exact CFM setting.
2. **HP-COMFORT** – Heat Pump Comfort provides approximately 350 CFM per ton for higher than normal heating air delivery temperature.
3. **HP-EFF** – Heat Pump Efficiency provides same airflow for heating and cooling modes to increase overall HP efficiency; approximately 400 CFM per ton with the AC/HP CFM ADJUST set to the nominal (NOM) tap.

The factory setting is AC (Refer to Figure 10 and Figure 16).

2.6.4 AC/HP CFM adjust

Select Medium, Low, or High Airflow

To provide airflow at rates described above, the AC/HP ADJUST select is factory set to the nominal (NOM) tap. The adjust selections HI/LO will regulate airflow supplied for all operational modes.

HI provides 10% airflow over nominal unit size selected and LO provides 10% airflow below nominal unit size selected.

Setting options are provided to adjust airflow supplied to meet individual installation needs for such things as noise, comfort, and humidity removal. (Refer to Figure 10 and Figure 16).

2.6.5 ON/OFF delay

Select desired time delay profile

NOTE: Delay selections are active in cooling and heat pump heating modes only. Electric heating modes have a one (1) minute OFF delay at 50% airflow and zero (0) ON delay programmed into the ECM motor that cannot be overridden.

Four (4) motor operation delay profiles are provided to customize and enhance system operation. (Refer to Figure 10 and Figure 16).

Selection options are:

1. **0/90:** No ON delay and 90 second OFF delay at 100% airflow (factory setting).
2. **30/90:** 30 second ON delay with no airflow and 90 second OFF delay at 100% airflow profile. Used when it is desirable to allow system coils time to heat-up/cool-down in conjunction with the airflow.
3. **0/0:** No delay option. Used for servicing unit or when a thermostat is utilized to perform delay functions.
4. **ENH:** enhanced selection provides a 30 second ON delay with no airflow followed by 150 seconds at

70% airflow, and no OFF delay for added comfort. This profile will minimize cold blow in heat pump operation and could enhance system efficiency.

2.6.6 Continuous fan

NOTE: If installed with a two-stage outdoor unit, do not select HI speed continuous fan. If HI is selected, low stage compression will also run HI fan speed possibly resulting in insufficient dehumidification.

Select desired fan speed when thermostat is set on continuous fan. (Refer to Figure 10 and Figure 16)

1. **LO speed** – factory setting, 50% cooling mode airflow.
2. **MED speed** – move connector to MED, 80% cooling mode airflow.
3. **HI speed** – move connector to HI, 100% cooling mode airflow.

2.6.7 Low-voltage circuit

Fusing and Reference

The low-voltage circuit is fused by a board-mounted 5-amp automotive fuse placed in series with the transformer SEC2 and the R circuit. The C circuit of the transformer is referenced to chassis ground through a printed circuit run at SEC1 connected to metal standoff marked with ground symbol.

2.6.8 Basic furnace configuration

The following basic configuration of the furnace will provide ARI rated performance of an air conditioner:

1. **HEAT KW/CFM** – Select the heater range for the size electric heater installed.
2. **AC/HP SIZE** – Select system size installed.
3. **SYSTEM TYPE** – Select system type AC
4. **AC/HP CFM ADJUST** – Select NOM.
5. **ON/OFF DELAY** – Select 0/90 profile.
6. **CONTINUOUS FAN** – Select desired fan speed when thermostat is set to continuous fan.

The following basic configuration of the furnace will provide ARI rated performance of a heat pump:

1. **HEAT KW/CFM** – Select the heater range for the size electric heater installed.
2. **AC/HP SIZE** – Select system size installed.
3. **SYSTEM TYPE** – Select system type HP-EFF
4. **AC/HP CFM ADJUST** – Select NOM.
5. **ON/OFF DELAY** – Select 0/90 profile.
6. **CONTINUOUS FAN** – Select desired fan speed when thermostat is set to continuous fan.

2.7 INSTALLATION OF ACCESSORIES

! WARNING

ELECTRICAL SHOCK HAZARD

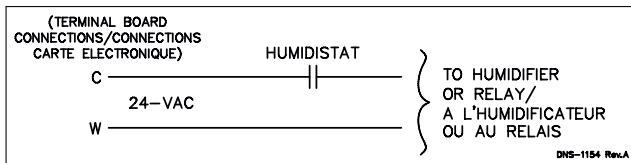
Turn OFF electrical power at the fuse box or service panel before making any electrical connection and ensure that a proper ground connection is made before connecting line voltage.

Failure to do so can result in death or bodily injury.

2.7.1 Humidifier and humidistat connection

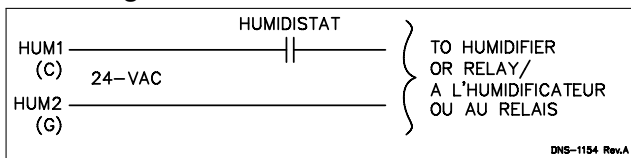
Fan Control Board terminals HUM1 (directly connected internally to C on terminal block) and HUM2 (directly connected internally to G on terminal block) are provided for direct connections to the low-voltage control of a humidifier through a standard humidistat (refer to Figure 11).

Figure 11: Standard humidistat connections



These terminals are energized with 24 VAC when G thermostat signal is present. Alternately, the 24 VAC signal may be sourced from the W1 and C terminal block connections when electric heaters are used as a primary heating source (refer to Figure 12).

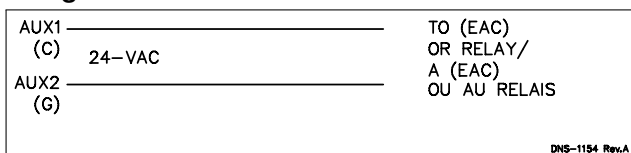
Figure 12: Thermostat connections



2.7.2 Electronic Air Cleaner (EAC) connections

Fan Control Board terminals AUX1 (directly connected internally to C on terminal block) and AUX2 (directly connected internally to G on terminal block) are provided for direct connections to the low-voltage control of an electronic air cleaner. These terminals are energized with 24 VAC when G thermostat signal is present (refer to Figure 13).

Figure 13: Electronic air cleaner connections



2.7.3 Dehumidify capability with standard humidistat connection

Latent capacities for systems using this unit are better than average systems. If increased latent capacity is an application requirement, the field wiring terminal block provides a connection terminal (DH) for use of a standard humidistat. The furnace control will detect the humidistat contact opening on increasing humidity and reduce its airflow to approximately 80% of nominal cooling mode airflow. This reduction will increase the system latent capacity until the humidity falls to a level which causes the humidistat contact to close its contacts. When the contact closes again, the airflows comes back to 100% of the cooling airflow selected.

2.7.4 Use of a heat pump

When using a heat pump, a thermostat with dual fuel option or a fossil fuel kit is required that prevents the operation of the electric elements and the heat pump at the same time. Refer to the instructions provided with the thermostat or the "Fossil Fuel" kit for the proper wiring of the furnace and the heat pump.

The simultaneous operation of the electric elements and the heat pump will cause overheating of either unit. The safety controls of the appliances will shut down the elements or heat pump, since they are not designed to function in this fashion.

3 OPERATION

3.1 START-UP

Before starting up the unit, be sure to check that the following items are in compliance:

1. The electrical installation and ventilation are conform;
2. The blower access door is in place and the blower rail locking screws are well tightened;
3. The blower speed adjustments for heating and air conditioning are appropriate and in accordance with to the specifications in this manual;
4. The thermostat of the room is in heating mode and is set higher than the ambient temperature;
5. The breakers on front panel are set on the "ON" position.

To start the unit, turn the main electrical switch on.

3.2 USE OF MANUAL FURNACE CONTROLS ON ADVANTAGE FURNACE

When there is a demand for heat, the pilot light (L-1) comes on. Refer to the wiring diagram.

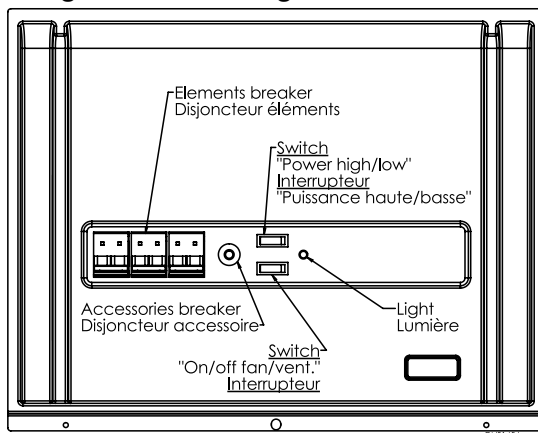
When the "HI/LO" switch is put into the "LO" position, it will shut down approximately half the elements.

However, it is important to put the switch back to the "HI" position during the winter months to ensure adequate heating.

Also, this switch must remain in the "HI" position when a 2-stage or outdoor thermostat is used to control the electric elements of the second stage. Refer to the diagram in Section 2.5. The "ON/OFF VENT/FAN" switch engages the blower in the continuous low speed mode. This will filter the air and provide for better air distribution in the building.

The 15 A circuit breaker is there to protect the motor and the control circuit conductors. If the unit does not function, press the circuit breaker button to see if it may have disengaged due to a power surge. If the breaker has to be pressed again, the unit must be checked by a qualified service technician.

Figure 14: Advantage furnace controls



3.3 OPERATING SEQUENCE

This unit is designed to provide the required airflow in order to match with any of four (4) different electronic heat capacity, air conditioner or heat pump outdoor unit sizes (see Tables 3 and 4 for CFM values).

Also, the blower motor is a true variable speed motor designed to deliver constant CFM. Constant CFM is valid for systems with total external static pressure between 0.1 and 0.8 inches water column.

Refer also to Table 1 for sequence of operation summary, depending on thermostat inputs and types.

3.3.1 Continuous fan

- Thermostat closes circuit R to G.
- Blower runs at continuous fan airflow.

3.3.2 Cooling mode - single stage

NOTE: For single stage systems, do not use the Y1 terminal.

- If indoor temperature is above temperature set point and humidity is below humidity set point, thermostat closes circuits R to G, R to Y/Y2 and R to O.
- Furnace delivers single stage cooling airflow.

3.3.3 Cooling mode - two stage

- First stage (low) cooling:** Thermostat closes circuits R to G, R to O, and R to Y1. Furnace delivers low stage cooling airflow.
- Second stage (high) cooling:** Thermostat closes circuits R to G, R to O, R to Y1 and R to Y/Y2. Furnace delivers high stage cooling airflow.

3.3.4 Cooling mode – dehumidification

NOTE: Remove jumper « J1 » on board to activate this function. (Refer to Figure 10 and Figure 16)

- If indoor temperature is above temperature set point and humidity is above humidity set point, thermostat closes circuits R to G, R to Y/Y2 and R to O and humidistat opens circuit R to DH.
- The furnace delivers airflow which is approximately 80% of the nominal cooling airflow to increase the latent capacity of the system.

3.3.5 Electric heating mode - modulating thermostat

The thermostat sends a heating demand in the form of a pulse width modulated wave that varies between 5 and 100%. The heating unit will apply this power ratio to the maximum available power. The electrical elements will modulate to the required power and the fan will adjust itself automatically in order to reach the required temperature rise.

3.3.6 Electric heating mode - Communicating thermostat

The thermostat sends a heating demand from 5 to 100% using a communicating protocol. The heating unit will apply this power ratio to the maximum available power. The electrical elements will modulate to the required power and the fan will adjust itself automatically in order to reach the required temperature rise.

3.3.7 Heat pump heating mode – Modulating thermostat outdoor unit single stage

NOTE: For single stage systems, do not use the Y1 terminal.

- Thermostat closes circuits R to G and R to Y/Y2.
- Furnace delivers selected heat pump heating airflow.

3.3.8 Heat pump heating mode – Modulating thermostat, outdoor unit two stage

- First stage (low) heating: Thermostat closes circuits R to G and R to Y1. Furnace delivers low stage heating airflow.
- Second stage (high) heating: Thermostat closes R to G, R to Y1 and R to Y/Y2. Furnace delivers high stage heating airflow.

WARNING

ELECTRICAL SHOCK OR UNIT DAMAGE HAZARD
Failure to carefully read and follow this WARNING could result in equipment malfunction, property damage, personal injury and/or death.
Disconnect power to unit before removing or replacing connectors or servicing motor. Wait at least five (5) minutes after disconnecting power before handling.

3.4 AIRFLOW VERIFICATION

Verify the airflow by taking readings of the following points, while the elements are in heating mode:

- Total amperage of all the heating elements;
- Voltage at the furnace;
- Supply air temperature. The point of the reading must not be affected by radiant heat from the elements;
- Return air temperature.

From these readings, one can arrive at an approximate calculation of the average airflow. To do that, the following formula should be used:

$$\text{Liter/s} = \frac{0.82 \times \text{amps.} \times \text{volts}}{\text{Diff. temperature } ^\circ\text{C}}$$

$$\text{CFM} = \frac{3.1 \times \text{amps.} \times \text{volts}}{\text{Diff. temperature } ^\circ\text{F}}$$

Tables 3 and 4 show estimated airflows for various temperature rises.

3.4.1 Supply Air Temperature Rise Test

- Operate the unit at maximum power for at least 10 minutes;
- Measure the air temperature in the return air plenum;
- Measure the air temperature in the largest trunk coming off the supply air plenum, just outside the range of radiant heat from the heat exchanger. 0.3

m (12") from the plenum of the main take-off is usually sufficient;

- Calculate the temperature rise by subtracting the return air temperature from the supply air temperature.

If the temperature rise exceeds the temperature specified in Table 2 by 5°F/2.8°C, move the "AC/HP CFM ADJUST" black wire to high (HI) position. If the excessive temperature rise cannot be reduced by increasing fan speed, investigate for ductwork obstructions or dirty and improper air filter.

CAUTION

It is important to check the airflow and to ascertain that the unit does not operate above the temperatures specified in the Technical Specifications (Table 2). This is particularly important if a cooling coil or a heat pump has been installed in the ducts.
Hi-Limit thermal protectors should never need to engage during the normal functioning of the appliance. They are strictly designed to engage during the improper functioning of the blower or when the filter was improperly maintained.

3.4.2 High limit verification

After operating the furnace for at least 15 minutes, restrict the return air supply by blocking the filters or the return air register and allow the furnace to shut off on High Limit. The electric heaters must deactivate themselves before the warm air temperature exceeds 200°F (93°C). Remove the obstruction and the elements should restart after a few minutes.

4 MAINTENANCE

WARNING

ELECTRICAL SHOCK HAZARD
Turn OFF power to the furnace before any disassembly or servicing.
Failure to do so can result in death, bodily injury and/or property damage.

Preventive maintenance is the best way to avoid unnecessary expense and inconvenience. Have your heating system inspected by a qualified service technician once a year. Do not attempt to repair the furnace or its controls. Call a qualified service technician. Before calling for repair service, check the following

points:

1. Check fuses or the circuit breakers;
2. Check if the 15 A circuit breaker on the furnace is disengaged;
3. Check if the 5 A fuse of the control board is blown;
4. Set the thermostat higher than room temperature. If the unit does not start up, cut the power and call a qualified service technician.

When calling for service or ordering a replacement part, specify the model and serial number of your appliance.

4.1 AIR FILTER

The disposable filter should be replaced twice a year. The presence of animal hair, dust, etc. may necessitate more frequent changes. Dirty filters have an adverse effect on the performance of the central heating system.

4.2 MOTOR LUBRICATION

Do not lubricate the blower motor, since it is permanently lubricated.

5 FURNACE INFORMATION

Model: Serial number:

Furnace installation date:

Service telephone # - Day: Night:

Dealer name and address:

.....

START-UP RESULTS

Voltage: ElementsTotal current :

Supply air temperature: Return air temperature:

Supply air duct static pressure: Return air duct static pressure:

Total pressure: Calculated air flow:

Current consumed by the blower motor: Current consumed by the accessories:

6 SEQUENCE OF OPERATION

Table 1: Sequence of operation

Mode	Thermostat to Control Board 24 VAC	Control	Control Function
Electric Heat only			
Continous Fan (Fan switch ON)	G	ON	Fan ON at the selected continous fan CFM
		OFF	Fan OFF
Thermostat calls for 1st stage Heat	W1 ▼	ON	Fan ON at 50% of the selected Heat CFM, 1st stage of Heat ON**
		OFF	1st stage of Heat OFF, Fan OFF
Thermostat calls for 2nd stage Heat	W1 & W2 ▼	ON	Fan ON at selected Heat CFM, 1st stage & 2nd stage of Heat ON**
		OFF	1er & 2eme stage du chauffage OFF, Ventilateur OFF
Cooling 1 stage, with Electric Heat			
Continous Fan (Fan switch ON)	G	ON	Fan ON at the selected continous fan CFM
		OFF	Fan OFF
Thermostat calls for 1st stage Heat	W1 ▼	ON	Fan ON at 50% of the selected Heat CFM, 1st stage of Heat ON**
		OFF	1st stage of Heat OFF, Fan OFF
Thermostat calls for 2nd stage Heat	W1 & W2 ▼	ON	Fan ON at selected Heat CFM, 1st stage & 2nd stage of Heat ON**
		OFF	1st stage & 2nd stage of Heat OFF, Fan OFF
Thermostat calls for Cooling	Y/Y2 & G	ON	Compressor ON, Fan ON after delays at selected Cooling CFM
		OFF	Compressor OFF, Fan OFF after selected cooling delays
Thermostat calls for Cooling & Dehumidification	Y/Y2 & G & (DH)*	ON	Compressor ON, Fan ON after delays at 80% of the selected Cooling CFM
		OFF	Compressor OFF, Fan OFF after selected cooling delays
Cooling 2 stages, with Electric Heat			
Continous Fan (Fan switch ON)	G	ON	Fan ON at the selected continous fan CFM
		OFF	Fan OFF
Thermostat calls for 1st stage Heat	W1 ▼	ON	Fan ON at 50% of the selected Heat CFM, 1st stage of Heat ON**
		OFF	1st stage of Heat OFF, Fan OFF
Thermostat calls for 2nd stage Heat	W1 & W2 ▼	ON	Fan ON at selected Heat CFM, 1st stage & 2nd stage of Heat ON**
		OFF	1st stage & 2nd stage of Heat OFF, Fan OFF
Thermostat calls for 1st stage Cooling	Y1 & G	ON	Compressor ON, Fan ON after delays at 80% of the selected Cooling CFM
		OFF	Compressor OFF, Fan OFF after selected cooling delays
Thermostat calls for 2nd stage Cooling	Y/Y2 & Y1 & G	ON	Compressor ON, Fan ON after delays at selected Cooling CFM
		OFF	Compressor OFF, Fan OFF after selected cooling delays
Thermostat calls for 2nd stage Cooling & Dehumidification	Y/Y2 & Y1 & G & (DH)*	ON	Fan ON at selected Heat CFM, 1st stage & 2nd stage of Heat ON**
		OFF	1st stage & 2nd stage of Heat OFF, Fan OFF
Heat pump 1 stage, with Electric Heat			
Continous Fan (Fan switch ON)	G	ON	Fan ON at the selected continous fan CFM
		OFF	Fan OFF
Thermostat calls for Cooling	Y/Y2 & G & O	ON	Compressor ON, Fan ON after delays at selected Cooling CFM
		OFF	Compressor OFF, Fan OFF after selected Cooling delays
Thermostat calls for Cooling & Dehumidification	Y/Y2 & G & O & (DH)*	ON	Compressor ON, Fan ON after delays at 80% of the selected Cooling CFM
		OFF	Compresseur OFF, Ventilateur OFF après les délais sélectionnés

... continued next page...

Mode	Thermostat to Control Board 24 VAC	Control	Control Function
Thermostat calls for 1st stage Heat (Heat pump heating mode)	Y/Y2 & G	ON	Compressor ON, Fan ON after delays at selected Heat Pump CFM
		OFF	Compressor OFF, Fan OFF after selected Heat Pump delays
Thermostat calls for 2nd stage Heat (Electric heat) △	W1 & W2 ▼	ON	Fan ON at selected Heat CFM, 1st stage & 2nd stage of Heat ON**
		OFF	1st stage & 2nd stage of Heat OFF, Fan OFF
Heat pump 2 stages, with Electric Heat			
Continuous Fan (Fan switch ON)	G	ON	Fan ON at the selected continuous fan CFM
		OFF	Fan OFF
Thermostat calls for 1st stage Cooling	Y1 & G & O	ON	Compressor ON, Fan ON after delays at 80% of the selected Cooling CFM
		OFF	Compressor OFF, Fan OFF after selected cooling delays
Thermostat calls for 2nd stage Cooling	Y/Y2 & Y1 & G & O	ON	Compressor ON, Fan ON after delays at selected Cooling CFM
		OFF	Compressor OFF, Fan OFF after selected cooling delays
Thermostat calls for 2nd stage Cooling & Dehumidification	Y/Y2 & Y1 & G & (DH)*	ON	Compressor ON, Fan ON after delays at 80% of the selected Cooling CFM
		OFF	Compressor OFF, Fan OFF after selected cooling delays
Thermostat calls for 1st stage Heat (Heat pump heating mode)	Y1 & G	ON	Compressor ON, Fan ON after delays at 80% of the selected Heat Pump CFM
		OFF	Compressor OFF, Fan OFF after selected Heat Pump delays
Thermostat calls for 2nd stage Heat (Heat pump heating mode)	Y1 & Y/Y2 & G	ON	Compressor ON, Fan ON after delays at selected Heat Pump CFM
		OFF	Compressor OFF, Fan OFF after selected Heat Pump delays
Thermostat calls for 3rd stage Heat (Electric Heat) △	W1 & W2	ON	Fan ON at selected Heat CFM, 1st stage & 2nd stage of Heat ON**
		OFF	1st stage & 2nd stage of Heat OFF, Fan OFF

*The 24 VAC is removed is remove from DH when there is a call for dehumidification

**Electric heat elements are controlled by relays with a delay sequence from Rectifier timer board on the relays

△ The thermostat must provide Dual Fuel option or a Fossil Fuel kit must be used (electric heat elements & Heat pump must not run at the same time)

▼ Jumper J2 on the electronic board provide connection between W1 & W2. Remove it for 2 stage Electric Heat using a 2 stages thermostat.

7 TECHNICAL SPECIFICATIONS

Table 2: Technical specifications(240V)

RATING AND PERFORMANCE	SUPxx-A240V12 Motor 1/2 HP / 240V						SUPxx-A240V20 Motor 1 HP / 240V				
	10	15	18	20	23	25	20	23	25	27	30
Capacity											
Power, total @ 240V / 208V (Kw)	10 / 7.5	15 / 11.3	18 / 13.5	20 / 15	23 / 17.3	25 / 18.8	20 / 15	23 / 17.3	25 / 18.8	27 / 20.3	30 / 22.5
Power, first stage @ 240V / 208V (Kw)	5 / 3.8	10 / 7.5	9 / 6.8	10 / 7.5	13 / 9.8	15 / 11.3	10 / 7.5	13 / 9.8	15 / 11.3	15 / 11.3	15 / 11.3
Net capacity @ 240V (BTU/h) / 208V	34,120 25,628	51,180 38,442	61,420 46,130	68,240 51,256	78,480 58,944	85,300 64,070	68,240 51,256	78,480 58,944	85,300 64,070	92,124 69,195	102,360 76,884
Temperature rise @ 240V (°F) ¹	68	54	65	53	60	57	65	58	58	59	65
ELECTRICAL SYSTEM											
Volts - Hertz - Phase	2 wires 240/208 - 60 - 1										
Electrical element #1 @ 240V / 208V (Kw)		5 / 3.7	4 / 3.1	5 / 3.7	4 / 3.1	5 / 3.7	5 / 3.7	4 / 3.1	5 / 3.7	5 / 3.7	5 / 3.7
Electrical element #2 @ 240V / 208V (Kw)	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7
Electrical element #3 @ 240V / 208V (Kw)		5 / 3.7	4 / 3.1	5 / 3.7	4 / 3.1	5 / 3.7	5 / 3.7	4 / 3.1	5 / 3.7	5 / 3.7	5 / 3.7
Electrical element #4 @ 240V / 208V (Kw)			5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	5 / 3.7	4 / 3.1	5 / 3.7
Electrical element #5 @ 240V / 208V (Kw)					5 / 3.7	5 / 3.7		5 / 3.7	5 / 3.7	4 / 3.1	5 / 3.7
Electrical element #6 @ 240V / 208V (Kw)										4 / 3.1	5 / 3.7
Blower motor Consumption @ 240V / 208V (Amp. Max.)	2.3 / 2.7	2.3 / 2.7	2.3 / 2.7	2.3 / 2.7	2.3 / 2.7	2.3 / 2.7	5.2 / 6.0	5.2 / 6.0	5.2 / 6.0	5.2 / 6.0	5.2 / 6.0
Heating Elements Consumption @ 240V / 208V (Amp)	41.4 / 35.9	62.1 / 53.8	75.8 / 65.7	82.8 / 71.8	96.5 / 83.6	103.5 / 89.7	82.8 / 71.8	96.5 / 83.6	103.5 / 89.7	113.6 / 98.5	124.3 / 107.7
Total Consumption @ 240V / 208V (Amp)	43.7 / 38.6	64.4 / 56.5	78.1 / 68.4	85.1 / 74.5	98.8 / 86.3	105.8 / 92.4	88.0 / 77.8	101.7 / 89.6	108.7 / 95.7	118.8 / 104.5	129.5 / 113.7
Ampacity - Terminal block #1 @ 240V / 208V (Amp) ²	TBD	TBD	94.7 / 83.2	103.2 / 90.5	119.3 / 104.5	127.7 / 111.8	106.5 / 94.3	122.7 / 108.3	131.1 / 115.6	53.1 / 48.0	57.3 / 51.7
Ampacity - Terminal block #2 @ 240V / 208V (Amp) ²	-	-	-	-	-	-	-	-	-	90.0 / 78.0	98.4 / 85.2
Breaker size - Terminal block #1 @ 240V / 208V (Amp) ²	60 / 50	80 / 70	100 / 90	125 / 90	125 / 125	150 / 125	125 / 100	125 / 125	150 / 125	60 / 50	60 / 60
Breaker size - Terminal block #2 @ 240V / 208V (Amp) ²	-	-	-	-	-	-	-	-	-	90 / 80	100 / 90
BLOWER DATA											
Motor (HP) / number of speeds	1/2 HP ECM EON						1 HP ECM EON				
Nominal blower size (diam. X width)	12 x 8						12 x 9				
GENERAL INFORMATION											
Overall dim. (width x depth x height)	22" x 22" x 36.5"										
Supply	20" x 20"										
Return	18" x 18"										
Filter quantity and size	(1) 20" x 20"										
Shipping weight	48 Kg / 105 lbs										
Maximum cooling capacity	3 tons						5 tons				

1) Select a blower speed that will generate the specified temperature rise.

2) Calculated on the basis of standard C22.2-236.

Figure 15: Furnace Dimensions

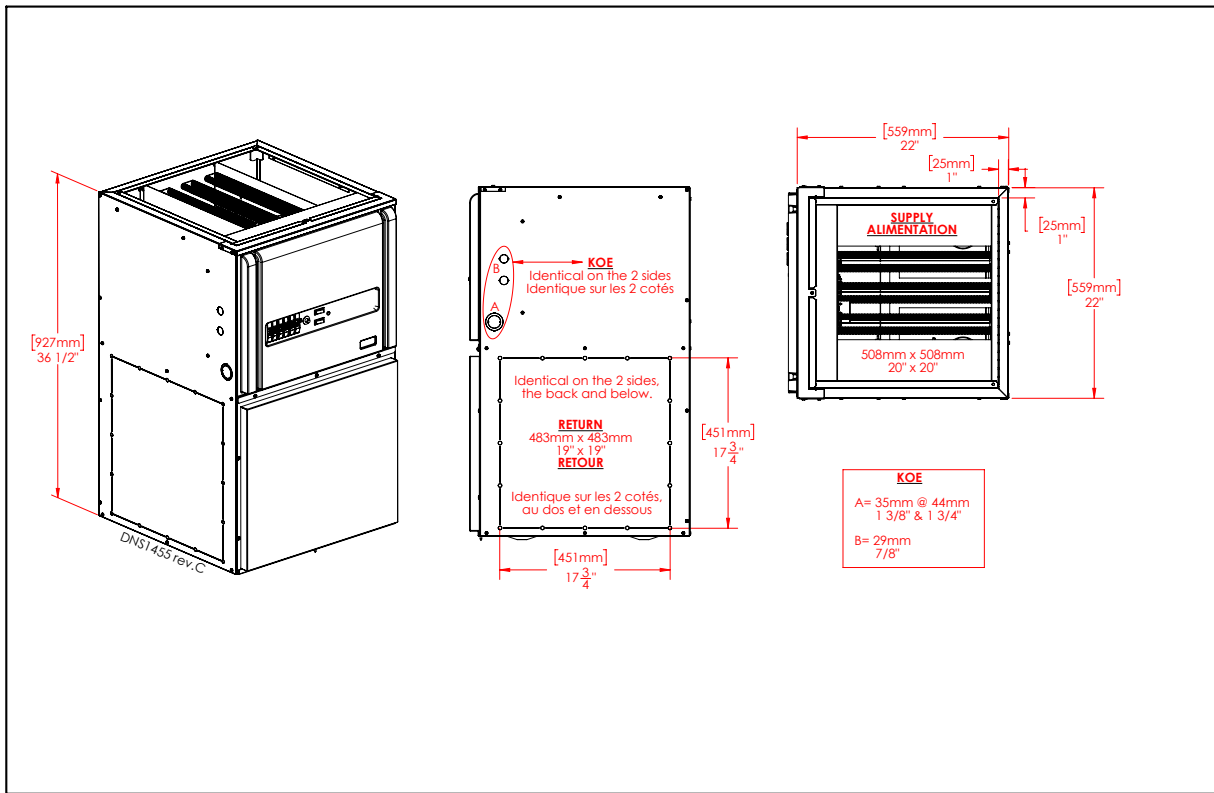


Table 3: Airflow tables SUPREME Advantage ECM ½ HP motor

COOLING OR HEAT PUMP HEATING MODE (WITH HP-EFF SELECTED ¹)				
AC / HP SIZE Adjustment BLUE wire position	A/C size (TONS)	CFM ² AC/HP CFM ADJUST BLACK wire position (BLK) = (NOM)	CFM ² AC/HP CFM ADJUST BLACK wire position (BLK) = (LO)	CFM ² AC/HP CFM ADJUST BLACK wire position (BLK) = (HI)
36	3,0	1200	1020	1300
30	2,5	1000	850	1150
24	2,0	800	680	920
18	1,5	600	510	690

¹ "SYSTEM TYPE" :

In HP mode, HP comfort gives 350 cfm/ton and HP efficiency gives 400cfm/ton

² In Cooling - Dehumidification mode (with Jumper **J1** remove), with no 24 VAC input to DH, the CFMs are reduced by 15%.

The CFMs shown are reduced by 20% if there is 24VAC input to Y1 only (Y/Y2 not powered)

CONTINUOUS FAN				
AC / HP SIZE Selection BLUE wire position	A/C size (TONS)	CFM ¹ CONTINUOUS FAN YELLOW wire position (YEL) = (LO)	CFM ¹ CONTINUOUS FAN YELLOW wire position (YEL) = (MED)	CFM ¹ CONTINUOUS FAN YELLOW wire position (YEL) = (HI)
36	3,0	600	960	1200
30	2,5	500	800	1000
24	2,0	400	640	800
18	1,5	300	480	600

¹ PCM quand AC/HP CFM ADJUST est à la position NOM. PCM inférieur ou supérieur de 10% si AC/HP CFM ADJUST est à la position LO ou HI.

ELECTRIC HEATING MODE			
HEAT KW/CFM adjustment RED wire position	POWER (kW)	CFM First Stage 24 VAC on W1 ¹	CFM Second stage 24VAC on W1 and/or W2 ¹
25	25	662	1257
23/20	23	616	1169
23/20	20	616	1169
18/15	18	530	1006
18/15	15	530	1006
10	10	351	666

¹Remove the Jumper **J2** when a 2 stages thermostat is used

Table 4: Airflow tables SUPREME Advantage ECM 1HP motor

COOLING OR HEAT PUMP HEATING MODE (WITH HP-EFF SELECTED ¹)				
AC / HP SIZE Adjustment BLUE wire position	A/C size (TONS)	CFM ² AC/HP CFM ADJUST BLACK wire position (BLK) = (NOM)	CFM ² AC/HP CFM ADJUST BLACK wire position (BLK) = (LO)	CFM ² AC/HP CFM ADJUST BLACK wire position (BLK) = (HI)
60	5,0	2000	1700	2100
48	4,0	1600	1358	1835
42	3,5	1400	1190	1610
36	3,0	1200	1022	1382

¹ "SYSTEM TYPE":

In HP mode, HP comfort gives 350 cfm/ton and HP efficiency gives 400cfm/ton

² In Cooling - Dehumidification mode (with Jumper **J1** remove), with no 24 VAC input to DH, the CFMs are reduced by 15%.

The CFMs shown are reduced by 20% if there is 24VAC input to Y1 only (Y/Y2 not powered)

CONTINUOUS FAN				
24 VAC (R) input on G only				
AC / HP SIZE Selection BLUE wire position	A/C size (TONS)	CFM ¹ CONTINUOUS FAN YELLOW wire position (YEL) = (LO)	CFM ¹ CONTINUOUS FAN YELLOW wire position (YEL) = (MED)	CFM ¹ CONTINUOUS FAN YELLOW wire position (YEL) = (HI)
60	5,0	1000	1600	2000
48	4,0	800	1280	1600
42	3,5	700	1120	1400
36	3,0	600	960	1200

¹ CFM's when AC/HP CFM ADJUST at NOM position. CFM's 10% lower or higher if AC/HP CFM ADJUST at LO or HI position.

ELECTRIC HEATING MODE			
24 VAC (R) input on W1 and/or W2 only			
HEAT KW/CFM adjustment RED wire position	POWER (kW)	CFM First Stage 24 VAC on W1 ¹	CFM Second stage 24VAC on W1 and/or W2 ¹
30/27	30	715	1424
30/27	27	715	1424
25	25	675	1345
23	23	620	1235
20	20	477	950

¹ Remove the Jumper **J2** when a 2 stages thermostat is used

Table 5: Venting Delays

ON & OFF DELAY FOR COOLING AND HEAT PUMP HEATING MODE		
ON / OFF DELAY Adjustment WHITE wire position	ON-Delay Time	OFF-Delay % "CFM" - Time
0 / 90	0 sec.	100% - 90 sec.
30 / 90	30 sec.	100% - 90 sec.
0 / 0	0 sec.	0 sec.
ENH	30 sec.	70 % - 150 sec.

DELAY PROFILE FOR ELECTRIC HEATING MODE		
No adjustment required	ON-Delay Time	OFF-Delay % CFM - Time
-	0 sec.	50% - 60 sec.

Figure 16: Electrical diagram, SUPREME Advantage ECM

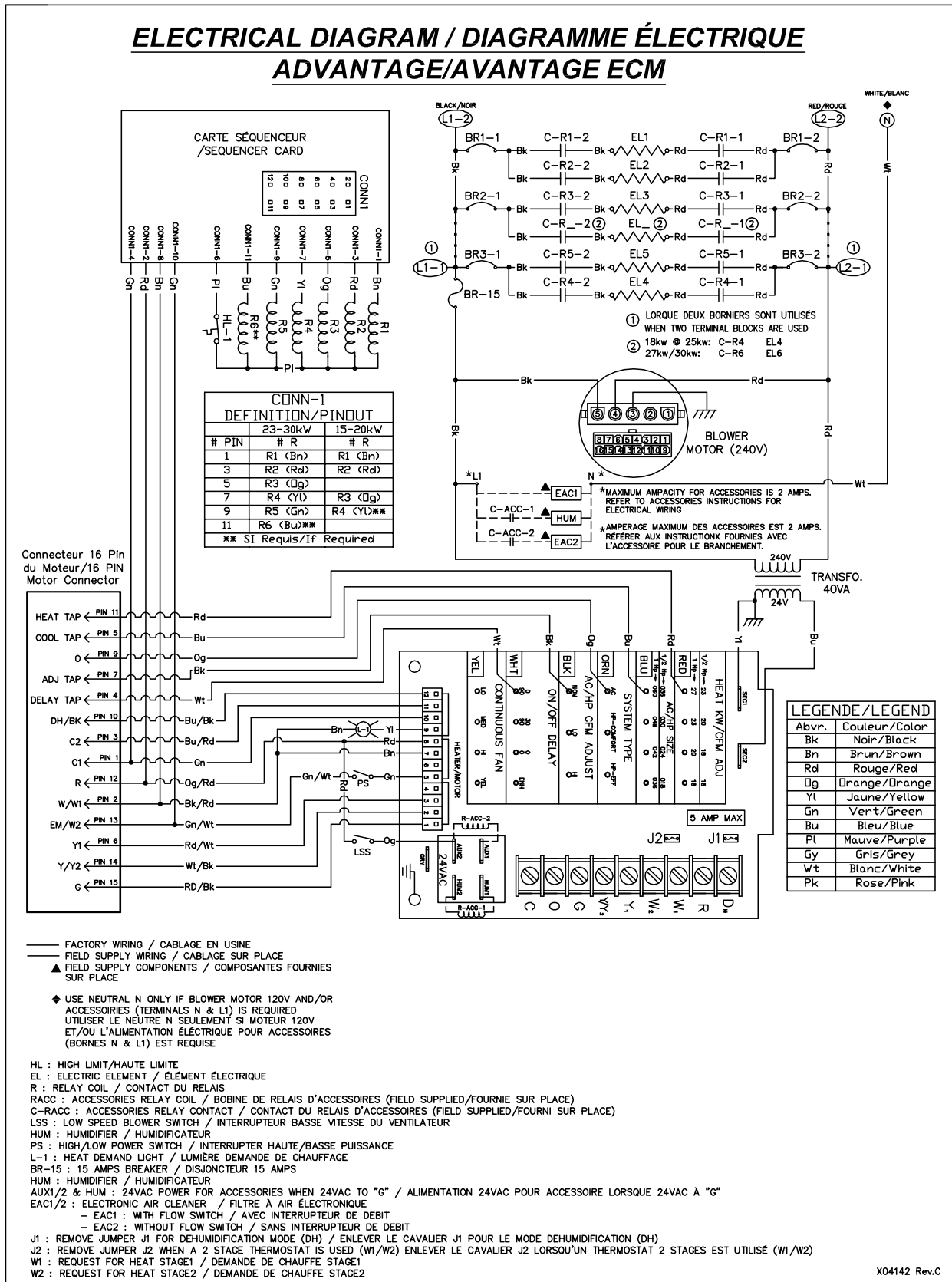
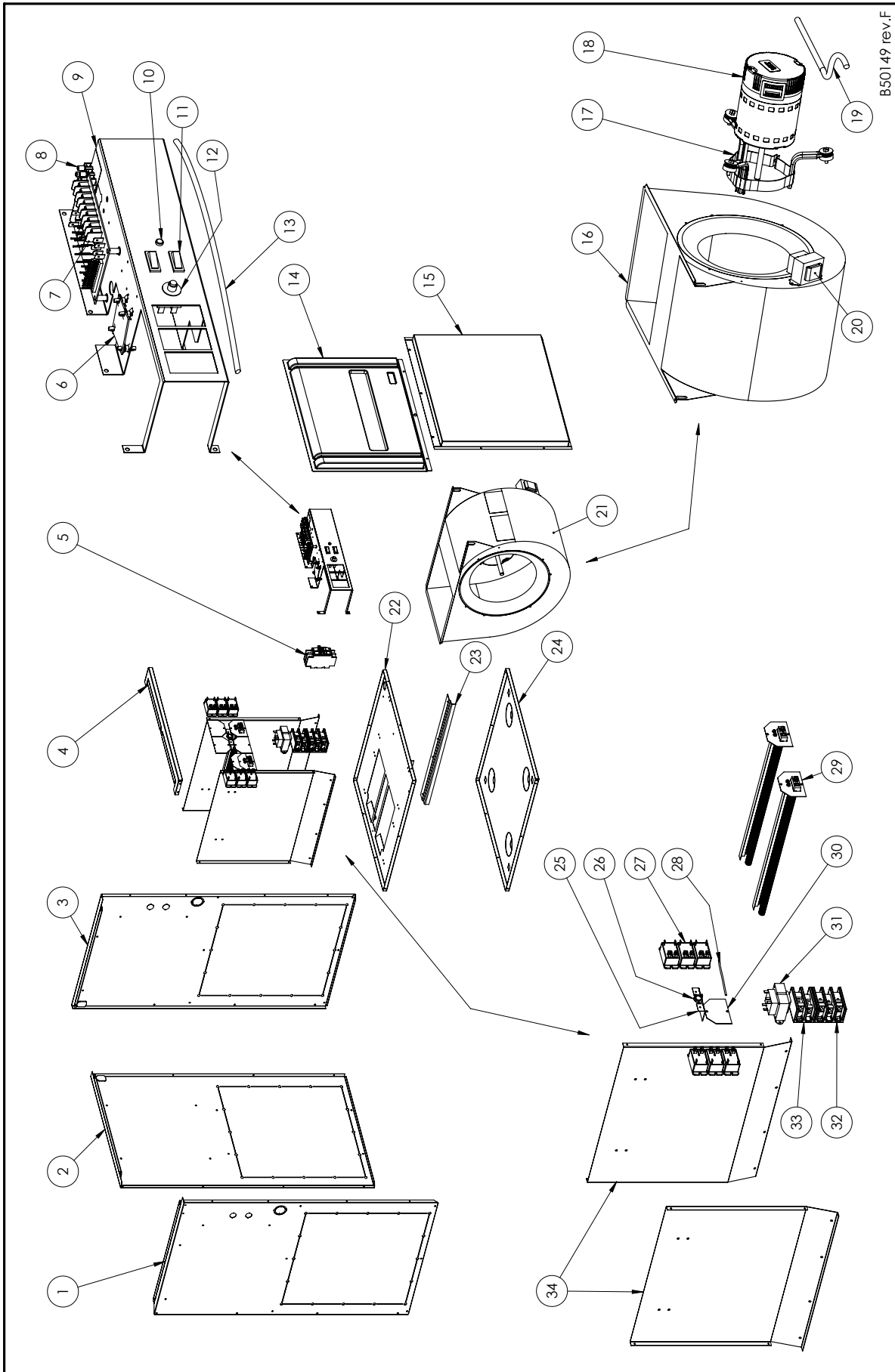


Figure 17: Parts list, Advantage ECM



B50149 rev.F

Table 6: Parts List, Advantage ECM

#	Item	Description	Note
1	B04343-04	Left side panel assembly	Includes insulation
2	B04344-02	Back panel assembly	
3	B04343-02	Right side panel assembly	Includes insulation
4	B04302-01	Top front panel	
5	L01J006	Breaker 60 A	
6	K03071-A	Sequencer card assembly	Card and plastic pins
7	B03531-03	Electronic card assembly	1/2 hp
7	B03531-04	Electronic card assembly	1 hp
8	B04000-01	Terminal strip	
9	B04550-04	Components support	1 breaker
9	B04550-05	Components support	2 breaker
9	B04550-06	Components support	3 breaker
10	L01L006	Indicator light	
11	L07F015	Switch SPDT	
12	L01J001	Breaker 15 A	
13	B04280	Electrical sequencer kit	27/30 kw
13	B04281	Electrical sequencer kit	23/25 kw
13	B04282	Electrical sequencer kit	18/20 kw
13	B04283	Electrical sequencer kit	15 kw
13	B04284	Electrical sequencer kit	10 kw
14	B04350-02	Top door	
15	B04349	Bottom door	
16	Z011036	Blower 112-9R (1 hp)	20 @ 30 kw
16	Z011035	Blower 112-8R (1/2 hp)	10 @ 25 kw
17	B01889	Motor support band and legs	
18	B03811-26	Motor ECM 1/2 hp (prog)	10 @ 25 kw
18	B03813-17	Motor ECM 1 hp (prog)	20 @ 30 kw
19	B04285	Electrical blower kit	
20	B03141-02	Inductor	
21	B04357-01	Blower assembly 1/2 hp ECM	10 @ 25 kw
21	B04357-02	Blower assembly 1 hp ECM	20 @ 30 kw
22	B04304	Fan separator	
23	B04309	Fan slide	
24	B04303	Floor	
25	B04308	Hi-limit deflector	
26	R02N028	Hi-limit 100+/-5.5C	
27	L01H030	Relay DPST 22 VDC	
28	B04369	Electrical power kit	
29	B04351-02	Element assembly	5kw
29	B04351-01	Element assembly	4kw
30	B04315-01	Element plate	
31	L01F010	Transformer 208/240/24	
32	L99F007	Terminal bloc 600V/175A (1423570)	3 positions
33	L99F008	Terminal bloc 600V/175A (1422570)	2 positions (27/30 kW only)
34	B04306	Deflector	

Table 7: Accessories

Item	Description	Note
BRB-SUP	Bottom return base	Ref: B04452
DFB-SUP	Base for downflow	Ref: B03310-03
K03081	Heat pump interface kit	
K06020	Filter rack	

