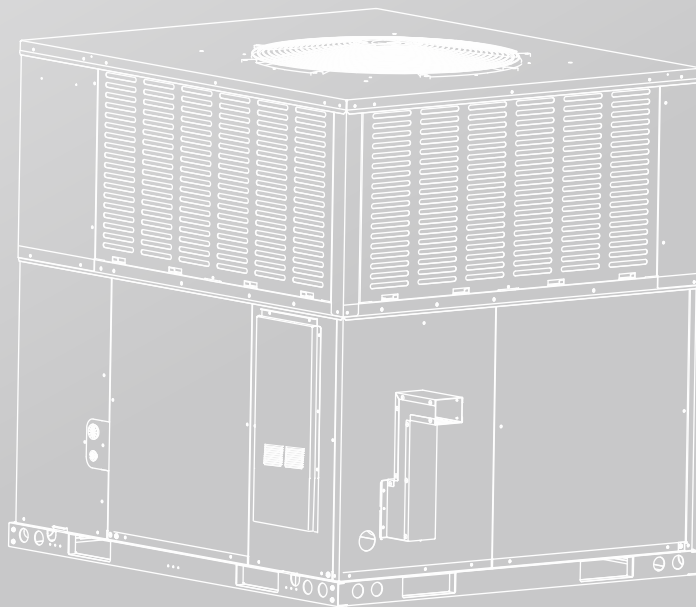




# INSTALLATION INSTRUCTIONS

PACKAGED GAS HEATING/ELECTRIC COOLING UNIT  
FEATURING R454B  
13.4 SEER2 SERIES - (2-5 Tons)



Original instructions.  
Please read this manual carefully and keep it for future reference.  
All the pictures in this manual are for illustrations purpose only.



CONFORMS TO UL  
STD. 60335-1 & UL  
STD. 60335-2-40 &  
ANSI STD. Z21.47  
CERTIFIED TO CSA  
STD. C22.2 No.  
60335-1 & CSA STD.  
C22.2 No. 60335-2-40  
& CSA STD. CSA 2.3



## RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION

### **⚠ WARNING**

#### **FIRE OR EXPLOSION HAZARD**

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

### **⚠ WARNING**

Do not store or use gasoline or other flammable vapors and liquids, or other combustible materials in the vicinity of this or any other appliance.

#### **WHAT TO DO IF YOU SMELL GAS**

- Do not try to light any appliance; do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Do not return to your home until authorized by the gas supplier or fire department.

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Refer to this manual, installation and service must be performed by a qualified installer, service agency or the gas supplier. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

### **⚠ WARNING**

Do not use this furnace if any part has been under water. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. A qualified service agency should be contacted to inspect the furnace and to replace all gas controls, control system parts, electrical parts that have been wet or the furnace if deemed necessary.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

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This document is customer property and is to remain with this unit.

These instructions do not cover all the different variations of systems nor does it provide for every possible contingency to be met in connection with installation.

All phases of this installation must comply with NATIONAL, STATE and LOCAL CODES. If additional information is required please contact your local distributor.

## 1 SAFETY

### 1.1 Safety Signs

#### **DANGER**

indicates a hazardous situation which, if not avoided, will result in death or serious injury

.....

#### **WARNING**

indicates a hazardous situation which, if not avoided, could result in death or serious injury

.....

#### **CAUTION**

indicates a hazardous situation which, if not avoided, could result in minor or moderate injury

.....

#### **NOTICE**

is used to address practices not related to physical injury

### Explanation of symbols displayed on the unit

|                                                                                     |                |                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>DANGER</b>  | This symbol shows that this appliance uses a mild flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire. |
|  | <b>CAUTION</b> | This symbol shows that the operation manual should be read carefully.                                                                                                      |
|  | <b>CAUTION</b> | This symbol shows that a service personnel should be handling this equipment with reference to the installation manual.                                                    |
|  | <b>CAUTION</b> | This symbol shows that information is available such as the operating manual or installation manual.                                                                       |

## 1.2 Safety Precautions

### WARNING

These instructions are intended as an aid to qualified, licensed service personnel for proper installation, adjustment and operation of this unit. Read these instructions thoroughly before attempting installation or operation.

Failure to follow these instructions may result in improper installation, adjustment, service or maintenance possibly resulting in fire, electrical shock, property damage, personal injury or death.

### WARNING

The manufacturer's warranty does not cover any damage or defect to the heat pump caused by the attachment or use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto or in conjunction with the heat pump. You should be aware that the use of unauthorized components, accessories or devices may adversely affect the operation of the heat pump and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices.

### WARNING

Disconnect all power to the unit before starting maintenance. Failure to do so can result in severe electrical shock or death.

### WARNING

The unit must be permanently grounded. A grounding lug is provided. Failure to ground this unit can result in fire or electrical shock causing property damage, severe personal injury or death.

### WARNING

This unit is designed certified for outdoor installation only. Installation inside any part of a structure can result in inadequate unit performance as well as property damage. Installation inside can also cause recirculation of flue products into the conditioned space resulting in personal injury or death.

### WARNING

The spark ignitor and ignition lead from the ignition control are high voltage. Keep hands or tools away to prevent electrical shock. Shut off electrical power before servicing any of the controls. Failure to adhere to this warning can result in personal injury or death.

### WARNING

Proposition 65: This appliance contains fiberglass insulation. Respirable particles of fiberglass are known to the state of California to cause cancer. Exhaust gas from this appliance contains chemicals, including carbon monoxide, known to the state of California to cause birth defects of other reproductive harm.

### WARNING

Never allow products of combustion or the flue products to enter the return air ductwork, or the circulating air supply. All return ductwork must be adequately sealed and secured to the furnace with sheet metal screws, and joints taped. All other duct joints must be secured with approved connections and sealed airtight. Failure to prevent products of combustion from being circulated into the living space can create potentially hazardous conditions, including Carbon Monoxide poisoning that could result in personal injury or death.

### WARNING

Holes in the exhaust transition or heat exchanger can cause toxic fumes to enter the home. The exhaust transition or heat exchanger must be replaced if they have holes or cracks in them. Failure to do so can cause Carbon Monoxide poisoning resulting in personal injury or death.

### WARNING

Do not attempt to manually light this furnace with a match or any open flame. Attempting to do so can cause fire or explosion resulting in property damage, personal injury or death.

### WARNING

Should overheating occur or the gas supply fail to shut off. Shut off the Manual Gas valve to the appliance before shutting off the supply. Failure to do so can result in an explosion or fire causing property damage, severe personal injury or death.

### WARNING

Turn off the main electrical power at the branch circuit disconnect closest to the unit before attempting any wiring. Failure to do so can cause electrical shock resulting in personal injury or death.

### WARNING

Turn off the main electrical power at the branch circuit disconnect closest to the unit before attempting any wiring. Failure to do so can cause electrical shock resulting in personal injury or death.

### **WARNING**

DO NOT JUMPER THIS DEVICE! Do not reset the overtemperature control without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation. Failure to do so can result in Carbon Monoxide poisoning or death. Replace this control only with the identical replacement part.

### **WARNING**

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation resulting in fire, electrical shock, property damage, personal injury or death.

### **WARNING**

This unit is equipped at the factory for use on Natural Gas only. Conversion to LP Gas requires a special kit enclosed instructions with. DO NOT BURN ANY LIQUID FUEL OR SOLID FUEL IN THIS UNIT. Burning any unapproved fuel will result in damage to this unit heat exchanger, which could result in fire, Carbon Monoxide poisoning, explosion, personal injury, property damage or death.

### **WARNING**

Install this unit only in a location and position as specified in the location requirements and considerations section of these instructions. Provide adequate combustion and ventilation air to the unit space as specified in the venting section of these instructions.

### **WARNING**

Do not use this unit during construction if air laden corrosive compounds are present such as chlorine and fluorine. Otherwise, provisions must be taken to provide clean, uncontaminated combustion and ventilation air to the unit, combustion and ventilation air contaminated with these compounds forms acids during combustion which corrodes the heat exchanger and component parts, some of these contaminants are found in, but not limited to, paneling, dry wall, adhesives, paints, stains, varnishes, sealers, and masonry cleaning materials.

### **WARNING**

Always install unit to operate within the unit's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified in ducting section of these instructions, see also unit rating plate.

### **WARNING**

#### **FIRE, EXPLOSION, ELECTRICAL SHOCK, AND CARBON MONOXIDE POISONING HAZARD**

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

### **WARNING**

Any person who is involved with working on or opening a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognized assessment credential.

Servicing shall only be performed as recommended by the equipment manufacturer.

Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of a person competent in the use of flammable refrigerants.

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to minimize the risk of ignition.

### **WARNING**

#### **REFRIGERANT OIL**

These units use R454B refrigerant. Use only R454B approved service equipment. These units use a POE oil that readily absorbs moisture from the atmosphere. To limit this 'hygroscopic' action, the system should remain sealed whenever possible. If a system has been open to the atmosphere for more than 4 hours, the compressor oil must be replaced. Never break a vacuum with air and always change the driers when opening the system for component replacement.

### **CAUTION**

#### **FURNACE RELIABILITY HAZARD**

Improper installation or misapplication of furnace may require excessive servicing or cause premature component failure.

Application of this furnace should be outdoors with special attention given to vent sizing and material, gas input rate, air temperature rise, unit leveling, and unit sizing.

## **WARNING**

When repairing the refrigerating system, comply with the following precautions prior to conducting work on the system:

- shall be undertaken according to controlled procedures so as to minimize the risk of the presence of flammable gases or vapors while the work is being performed.

- All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable environment.

Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

- If any brazing/welding is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available and easily accessible. Have a dry powder or CO<sub>2</sub> fire extinguisher adjacent to the charging area.

- When carrying out work in relation to a refrigerating system that involves exposing any pipe work, no sources of ignition shall be used in such a manner that it may lead to the risk of fire or explosion.

All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repair, or removal and disposal of the unit, during which refrigerant can possibly be released into the surrounding space. Prior to beginning work, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be clearly displayed.

Ensure that the area is in the open or that it is adequately ventilated before opening the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the surroundings.

Where electrical components are being changed, they shall be fit according to their purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using flammable refrigerants:

- The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.

- The ventilation machinery and outlets are operating adequately and are not obstructed.

- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.

- Equipment marking must remain visible and legible. Markings and signs that are illegible shall be corrected.

Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substances which may corrode refrigerant containing components, unless the components are constructed of materials that are inherently resistant to corrosion or are suitably protected against corrosion.

Repair and maintenance of electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until the fault has been dealt with satisfactorily.

If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so that all parties are advised. Initial safety checks shall include:

- That capacitors are discharged: this shall be done in a safe manner to avoid the possibility of sparking.

- That no live electrical components and wiring are exposed while charging, recovering or purging the system.

- That there is continuity of proper grounding.

## **WARNING**

Sealed electrical components shall be replaced.

Intrinsically safe components must be replaced.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Under no circumstances shall potential sources of ignition be used while searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated for the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant which requires brazing is found, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE: Examples of leak detection fluids are

- bubble method,

When breaking into the refrigerant circuit to make repairs - or for any other purpose - conventional procedures shall be used. However, for flammable refrigerants it is important that best practices be followed, since flammability is a consideration. The following procedure shall be adhered to:

- safely remove refrigerant following local and national regulations.

- evacuate.

- purge the circuit with inert gas.

- evacuate.

- continuously flush or purge with inert gas when using flame to open circuit; and.

- open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant they contain.

When use a refrigerant tank with siphon to add refrigerant, the refrigerant tank should be placed upright. When use a refrigerant tank without siphon to add refrigerant, the refrigerant tank should be placed upside down. Ensure that the refrigeration system is grounded prior to charging the system with refrigerant.

In general, R454B doesn't have a siphon tube or dip tube into tank. For this situation, they must be charged in liquid form to prevent fractionation of the blended refrigerant and that requires the jug to be inverted during charging.

Label the system when charging is complete (if it is not already labeled).

Take extreme care not to overfill the refrigeration system.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.

- a) Become familiar with the equipment and its operation.

- b) Isolate system electrically.

- c) Before attempting the procedure ensure that:

- mechanical handling equipment is available, if required, for handling refrigerant cylinders;

- all personal protective equipment is available and being used correctly;

- the recovery process is supervised at all times by a competent person;

- recovery equipment and cylinders conform to the appropriate standards.

- d) Pump down refrigerant system, if possible.

- e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

- f) Make sure that the cylinder is situated on the scales before recovery takes place.

- g) Start the recovery machine and operate it in accordance with the manufacturer's instructions.

- h) Do not overfill cylinders. (No more than 80% volume liquid charge).

- i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

- j) When the cylinders have been filled correctly and the process has been completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

- k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

Equipment shall be labeled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Do not use the air conditioner for other purposes.

In order to avoid any quality deterioration, do not use the unit for the cooling of precision instruments, food, plants, animals or works of art.

Before cleaning, be sure to stop the operation, turn the breaker off or unplug the supply cord. Otherwise, electric shock and injury may occur.

In order to avoid electric shock or fire, make sure that an earth ground detector is installed.

Never touch the air outlet or the horizontal blades while the swing flap is in operation. Your fingers may become caught or the unit may break down.

Never put any objects into the air inlet or outlet.

Objects touching the fan at high speed can be dangerous.

Never inspect or service the unit by yourself.

Ask a qualified service person to perform this task.

Do not dispose of this product as unsorted municipal waste. This waste should be collected separately for special treatment.

Do not dispose of electrical appliances as unsorted municipal waste. Use separate collection facilities. Contact your local government for information regarding the connection systems available.

If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, harming your health and well-being.

To prevent refrigerant leak, contact your dealer.

When the system is installed and operates in a small room, it is required to maintain the concentration of the refrigerant below the limit, in case a leak occurs. Otherwise, oxygen in the room may be affected, resulting in a serious accident.

The refrigerant in the air conditioner is safe and normally does not leak.

If the refrigerant leaks into the room and comes into contact with the fire of a burner, a heater or a cooker, a harmful gas could be released.

Turn off any combustible heating devices, ventilate the room, and contact the dealer where you purchased the unit.

Do not use the air conditioner until a service person confirms that the refrigerant leak is repaired.

Keep ventilation openings clear of obstruction.

## CAUTION

Be sure the air conditioner is grounded. In order to avoid electric shock, make sure that the unit is grounded and that the ground wire is not connected to a gas or water pipe, lightning conductor or telephone ground wire.

Do not operate the air conditioner with a wet hands. An electric shock may happen.

Do not operate the air conditioner when using a room fumigation-type insecticide. Failure to observe this precaution could cause the chemicals to become deposited in the unit, which could endanger the health of those who are hypersensitive to chemicals. It may also cause the refrigerant sensor to alarm.

To avoid oxygen deficiency, ventilate the room sufficiently if equipment with a burner is used together with the air conditioner.

Arrange the drain hose to ensure smooth drainage. Incomplete drainage may cause damage to the building, furniture, etc.

Never touch the internal parts of the controller. Do not remove the front panel. Some parts inside are dangerous to touch, and machine troubles may occur.

Attention is drawn to the fact that additional transportation regulations may exist with respect to equipment containing flammable gas. The maximum number of pieces of equipment or the configuration of the equipment permitted to be transported together will be determined by the applicable transport regulations.

Signs for similar appliances used in a work area are generally addressed by local regulations and give the minimum requirements for the provision of safety and/or health signs for a work location.

Storage package protection should be constructed such a way that mechanical damage to the equipment inside the package will not cause a leak of the refrigerant charge.

The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.

All required signs are to be maintained and employers should ensure that employees receive suitable and sufficient instruction and training on the meaning of appropriate safety signs and the actions that need to be taken in connection with these signs.

The effectiveness of signs should not be diminished by too many signs being placed together.

Any pictograms used should be as simple as possible and contain only essential details.

The storage of the appliance should be in accordance with the applicable regulations or instructions, whichever is more stringent.

Do not place appliances which produce open flame in places exposed to the air flow from the unit or under the indoor unit. It may cause incomplete combustion or deformation of the unit due to the heat.

Do not install the air conditioner in a location where flammable gas may leak out. If the gas leaks out and stays around the air conditioner, a fire may break out.

### **WARNING**

The appliance uses R454B refrigerant.



### **CAUTION**

#### **CUT HAZARD**

Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing furnaces.

### **WARNING**

These instructions are exclusively intended for qualified contractors and authorized installers.

Work on the refrigerant circuit with mild flammable refrigerant in safety group A2L may only be carried out by authorized heating contractors. These heating contractors must be trained in accordance with UL 60335-2-40, Section HH. The certificate of competence from an industry accredited body is required.

Work on electrical equipment may only be carried out by a qualified electrician.

Before initial commissioning, all safety – related points must be checked by the particular certified heating contractors. The system must be commissioned by the system installer or a qualified person authorized by the installer.

### **CAUTION**

A manufactured (mobile) home installation must conform with the Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280, or when this Standard is not applicable, the Standard for Manufactured Home Installations (Manufactured Home Sites, Communities and Set-Ups), ANSI/NCS A225.1, and/or MH Series Mobile Homes, CAN/CSA Z240.

### **CAUTION**

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

### **WARNING**

#### **ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD**

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

- Before servicing, disconnect all electrical power to furnace.
- When servicing controls, label all wires prior to disconnecting.  
Reconnect wires correctly.
- Verify proper operation after servicing.

Improper installation, adjustment, alteration, service, Maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product.

Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions include in literature and attached to the unit. Consult local building codes, the current editions of the National Fuel Gas Code (NFGC) NFPA 54/ANSI Z223.1 and the National Electrical Code (NEC) NFPA 70.

In Canada, refer to the current editions of the National Standards of Canada CAN/CSA-B149.1 and .2 Natural Gas and Propane Installation Codes, and Canadian Electrical Code CSA C22.1

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol.

DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards which could result in personal injury or death. CAUTION is used to identify unsafe practices which may result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which will result in enhanced Installation, reliability, or operation.

- Use only with type of gas approved for this unit. Refer to the unit rating plate.
- Install this unit only in a location and position as specified in the "Installation" section of these instructions.
- Provide adequate combustion and ventilation air to the unit space as specified in "Safety" section.
- Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified in the "Gas Supply, Condensate drain and Piping" section.
- Always install unit to operate within the furnace's intended temperature-rise range with a duct system which has an external static pressure within the allowable range, as specified in the "Safety" section. See also unit rating plate.
- When unit is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by duct(s) sealed to the furnace casing and terminating outside the space containing the furnace. See "Ductwork" and "Return Air" section.

- The unit may be used for construction heat provided that the furnace installation and operation complies with the CAUTION and WARNING instructions in this manual.

- The unit is design-certified for use with natural and propane gases (see unit rating plate) and for installation in outside only. The unit is factory-shipped for use with natural gas.

A listed accessory gas conversion kit is required to convert unit for use with propane gas. The LP conversion kit is included with the unit.

- The unit must be kept free and clear of insulating materials. Inspect surrounding area to ensure insulation material is in safe distance when installing furnaces or adding insulation materials. Insulation materials may be combustible.

See Table 3-1 for required clearances to combustible construction.

- Before heating season begins, exam the unit to determine that:
  - a. All flue gas carrying areas external to the unit (i.e. chimney, vent connector) are clear and free of obstructions.
  - b. The vent connector is in place, slopes upward and is physically sound without holes or excessive corrosion.
  - c. The return-air duct connection(s) is physically sound, is sealed to the furnace casing, and terminates outside the space containing the furnace.
  - d. The physical support of the unit is sound without sagging, cracks, gaps, etc around the base so as to provide a seal between the support and the base.
  - e. There are no obvious sign of deterioration of the unit.
  - f. The burner flames are in good adjustment (by comparison with pictorial sketches of the main burner flame.
- Furnace operation needs air for combustion and ventilation. Do not block or obstruct air openings on furnace or spacing around furnace required for supplying sufficient combustion air and ventilation.

## 1.3 Inspection

As soon as unit is received, it should be inspected and noted for possible shipping damage during transportation. It is the carrier's responsibility to cover the cost of shipping damage. Manufacturer or distributor will not accept the claims from dealer for any transportation damage.

## 1.4 Limitations

Refer to Fig. 2-2, 2-3 for unit physical data and to Table 7-1 for electrical data. If components are to be added to a unit they must meet local codes, they are to be installed at the dealer's and /or the customer's expense. Size of unit for proposed installation should be based on heat loss / heat gain calculations made in accordance with industry recognized procedures identified by the Air conditioning contractors of America.

**Note:** Rating plate must be left visible for future reference.

## FOR YOUR SAFETY READ BEFORE OPERATING



### WARNING



If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance does not have a pilot. it is equipped with an ignition device which automatically lights the burner.

**Do not** try to light the burner by hand.

- B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

### FOR YOUR SAFETY WHAT TO DO IF YOU SMELL GAS

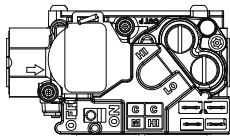
- Do not try to light any appliance; do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a

neighbor's phone. Follow the gas supplier's instructions.

- If you cannot reach your gas supplier, call the fire department.
  - Do not return to your home until authorized by the gas supplier or fire department.
- C. Use only your hand to turn the gas control switch. Never use tools. If the switch will not turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

## OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.



**SWITCH SHOWN IN  
THE "OFF" POSITION**

5. Remove control access panel.
6. Wait five (5) minutes to clear out any gas. if you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
7. Push gas control switch to "ON".  
NOTE: Do not force.
8. Replace control access panel.
9. Turn on all electric power to the appliance.
10. Set thermostat to desired setting
11. If the appliance will not operate, follow instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

## TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Push gas control to "OFF". Do not force.
5. Replace control access panel.

See Fig: Instruction of lighting/ shutdown operation. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting of the electrical supply.

## 2 INTRODUCTION

A Package Gas Electric Unit is a fully self-contained, combination gas heating/electric cooling unit designed for outdoor installation. All unit sizes have return and discharge openings for both horizontal and downflow configurations, and are factory shipped with all downflow duct openings covered. Units may be installed either on a rooftop or on a cement slab.

In gas heating mode, this unit is designed for a minimum continuous return-air temperature and a maximum continuous return-air temperature. Failure to follow these return-air temperature limits may affect reliability of heat exchangers, motors, and other components.

This booklet contains the installation and operating instructions for your Package Gas Electric Unit. There are some precautions that should be taken. Improper installation can result in unsatisfactory operation or dangerous conditions. Read this booklet and any instructions packaged with separate equipment required to make up the system prior to installation. Give this booklet to the owner and explain its provisions.

The owner should retain this booklet for future reference.

A Package Gas Electric Unit includes a hermetically-sealed refrigerating system consisting of a compressor, condenser coil, evaporator coil with thermal expansion valve (TXV) or throttle valve, a circulation air blower, a condenser fan, a heat exchanger assembly, gas burner and control assembly, combustion air motor and fan, and all necessary internal electrical wiring. The cooling system of these units is factory-evacuated, charged and performance tested. All units are factory charged with Refrigerant R454B.

The figure shown in this manual is for reference only and may be slightly different from the actual product.

PGE0242301134060, PGE0302301134060, PGE0362301134090

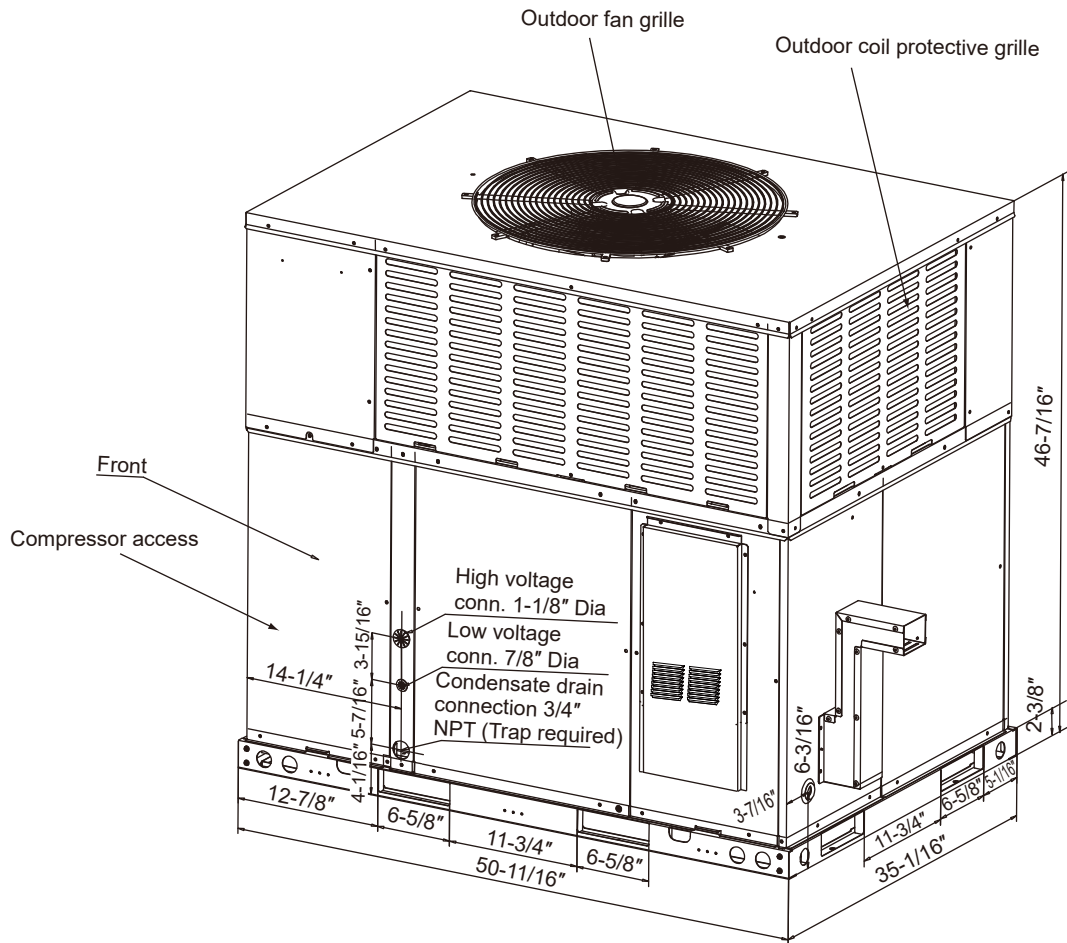


Fig. 2-1 Unit Dimensions

\* The above figure for reference purpose only.

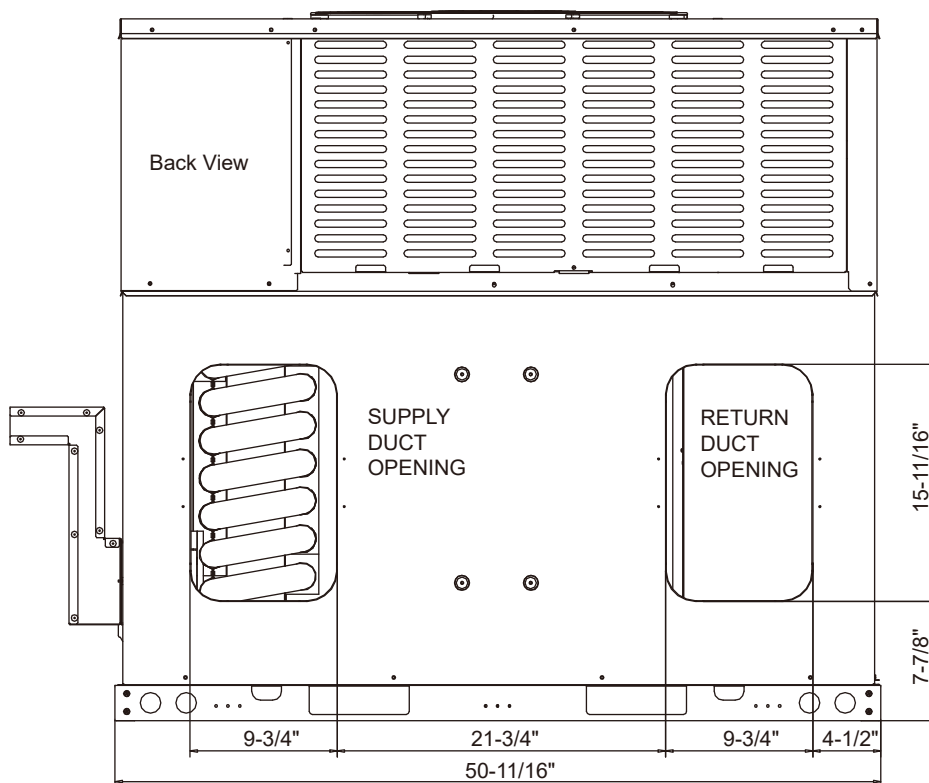
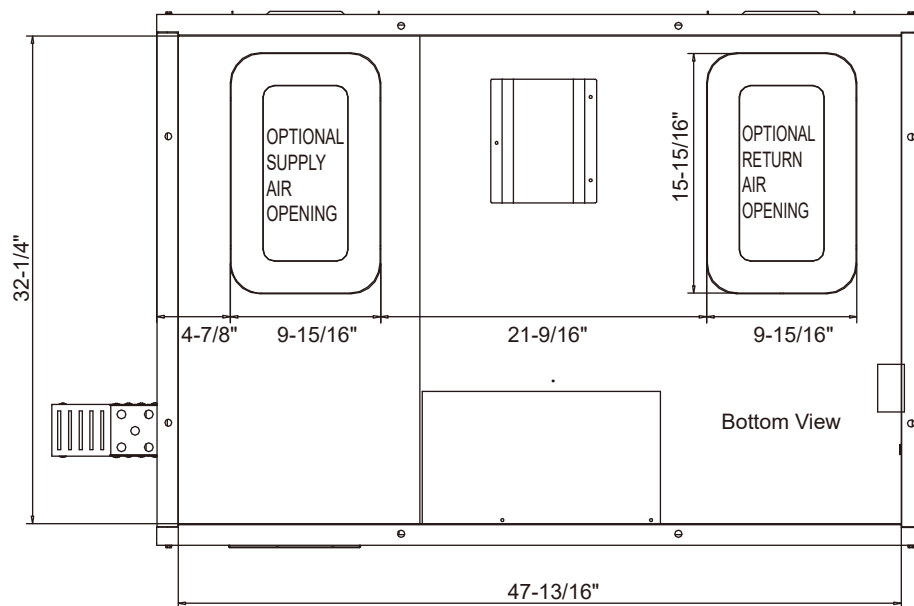


Fig. 2-2 Dimensions Back and Bottom

\* The above figure for reference purpose only.

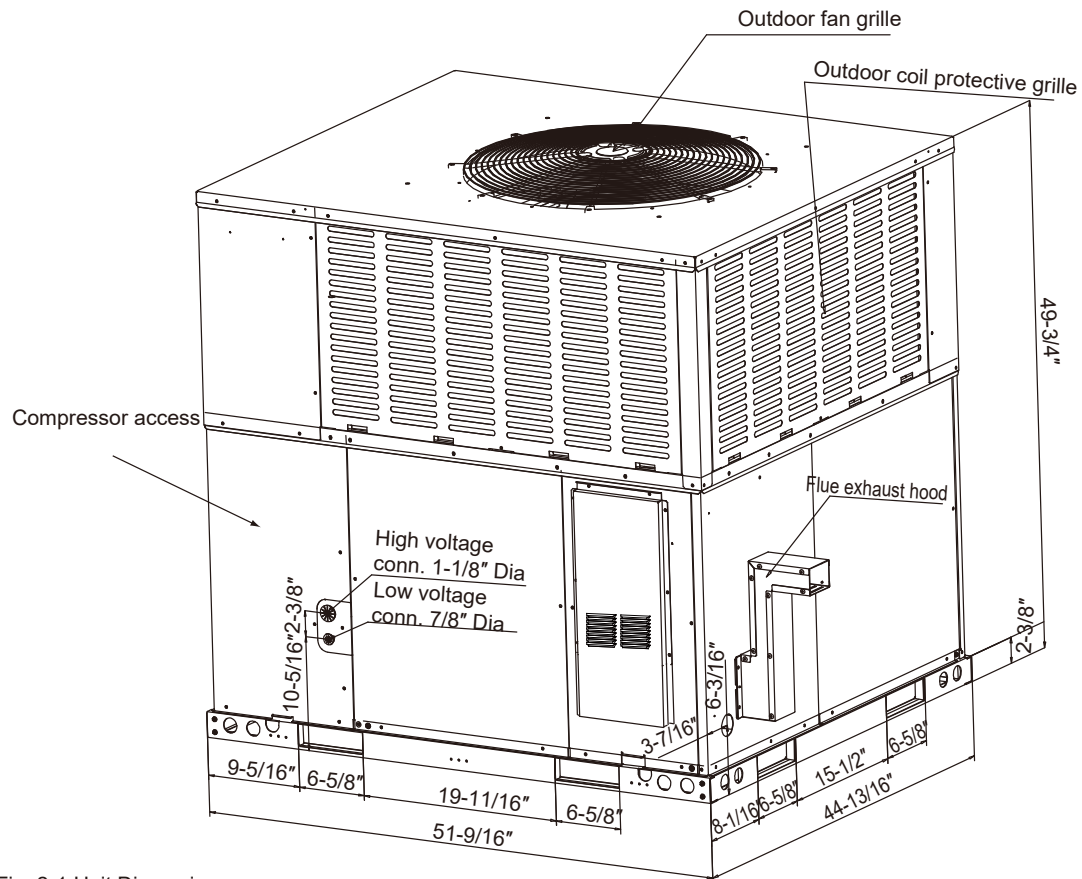
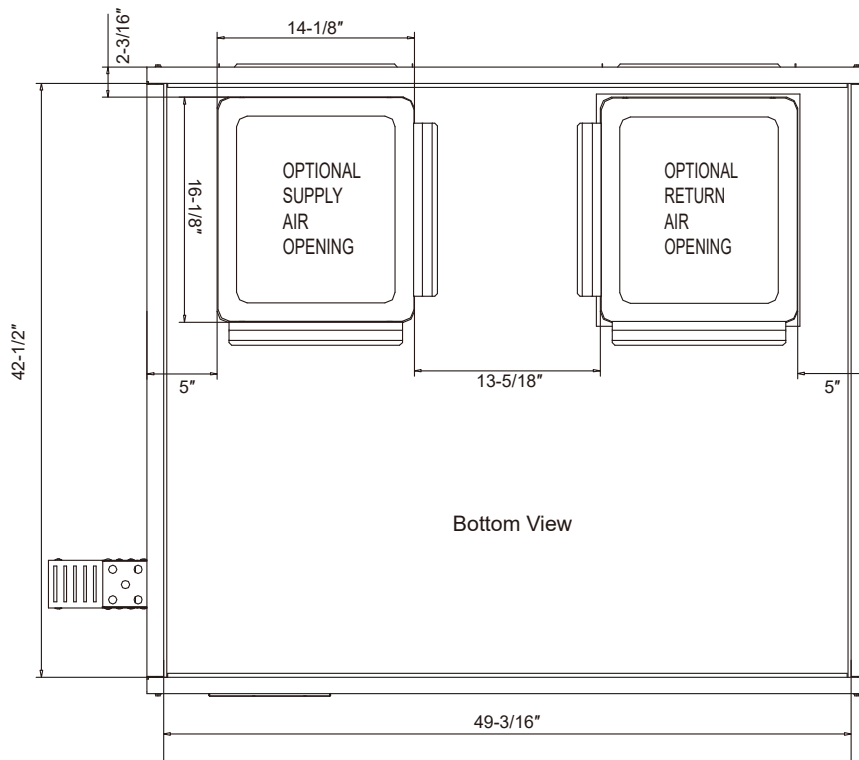


Fig. 2-1 Unit Dimensions



\* The above figure for reference purpose only.

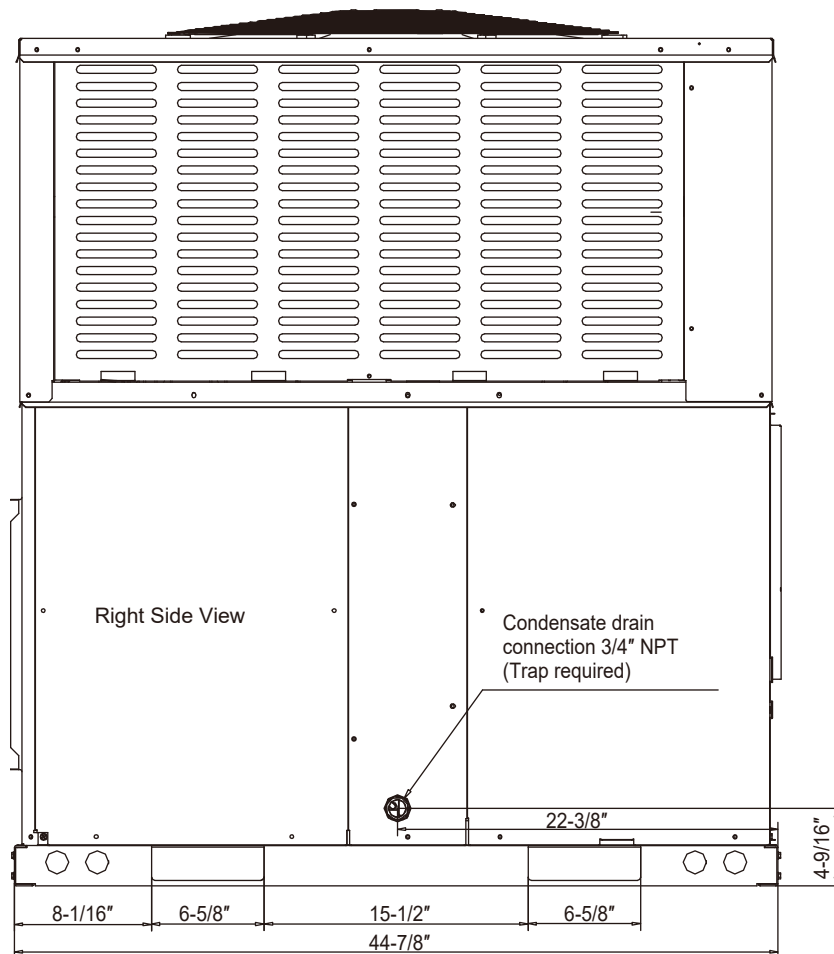
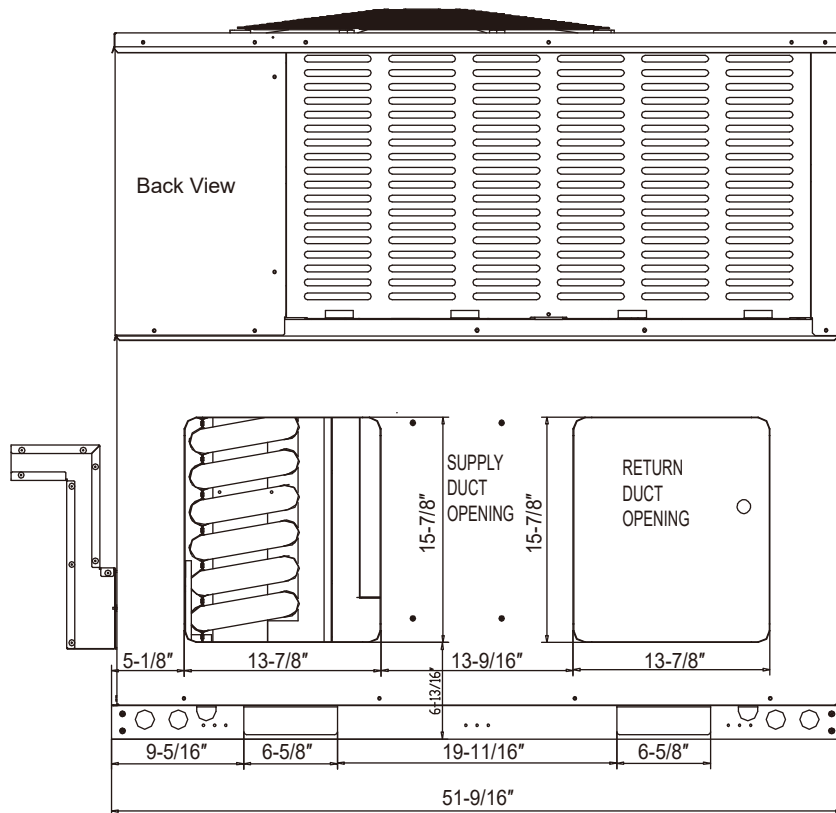


Fig. 2-2 Dimensions Back and Bottom

\* The above figure for reference purpose only.

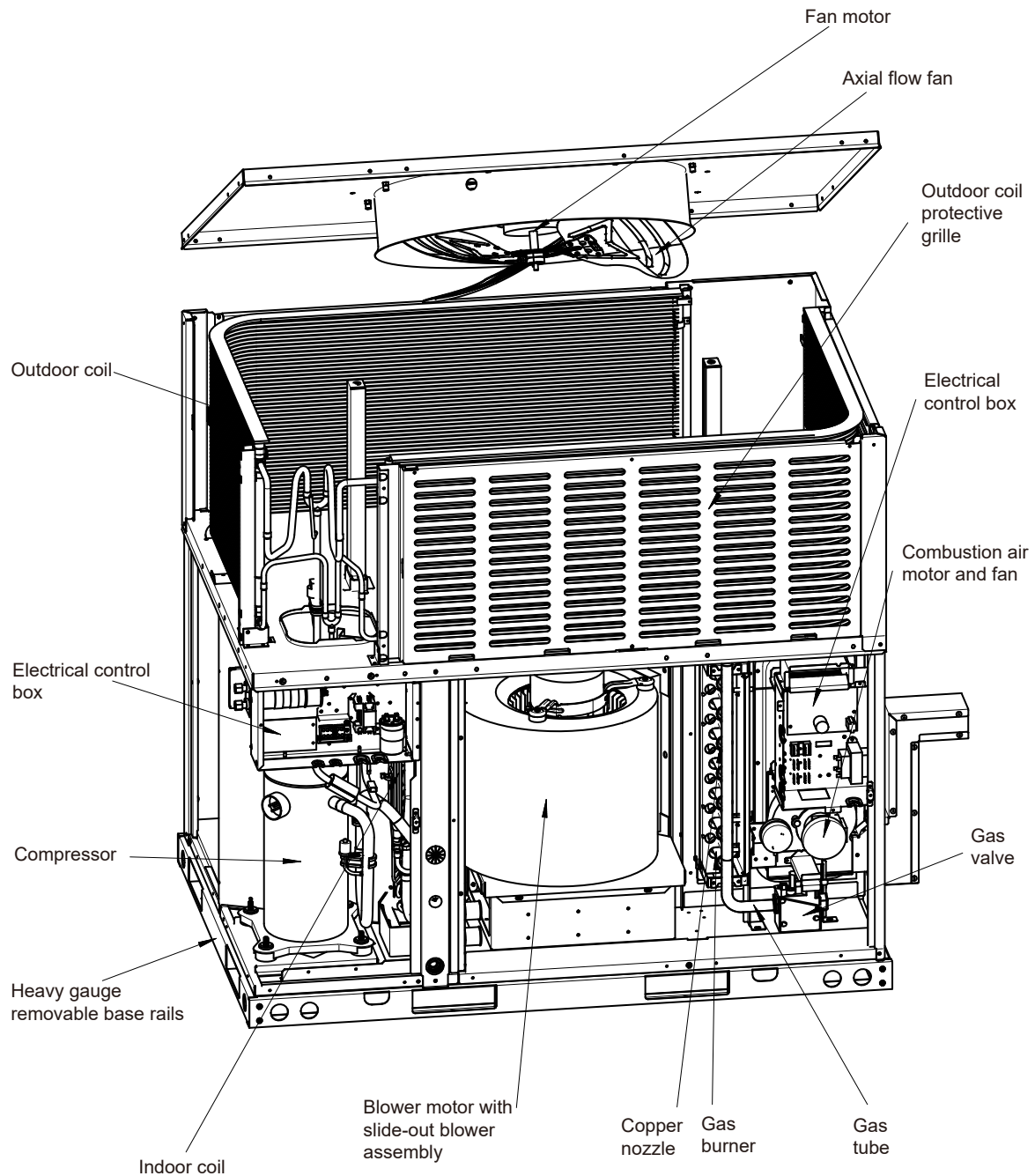


Fig. 2-3 Component Location

\* The above figure for reference purpose only.

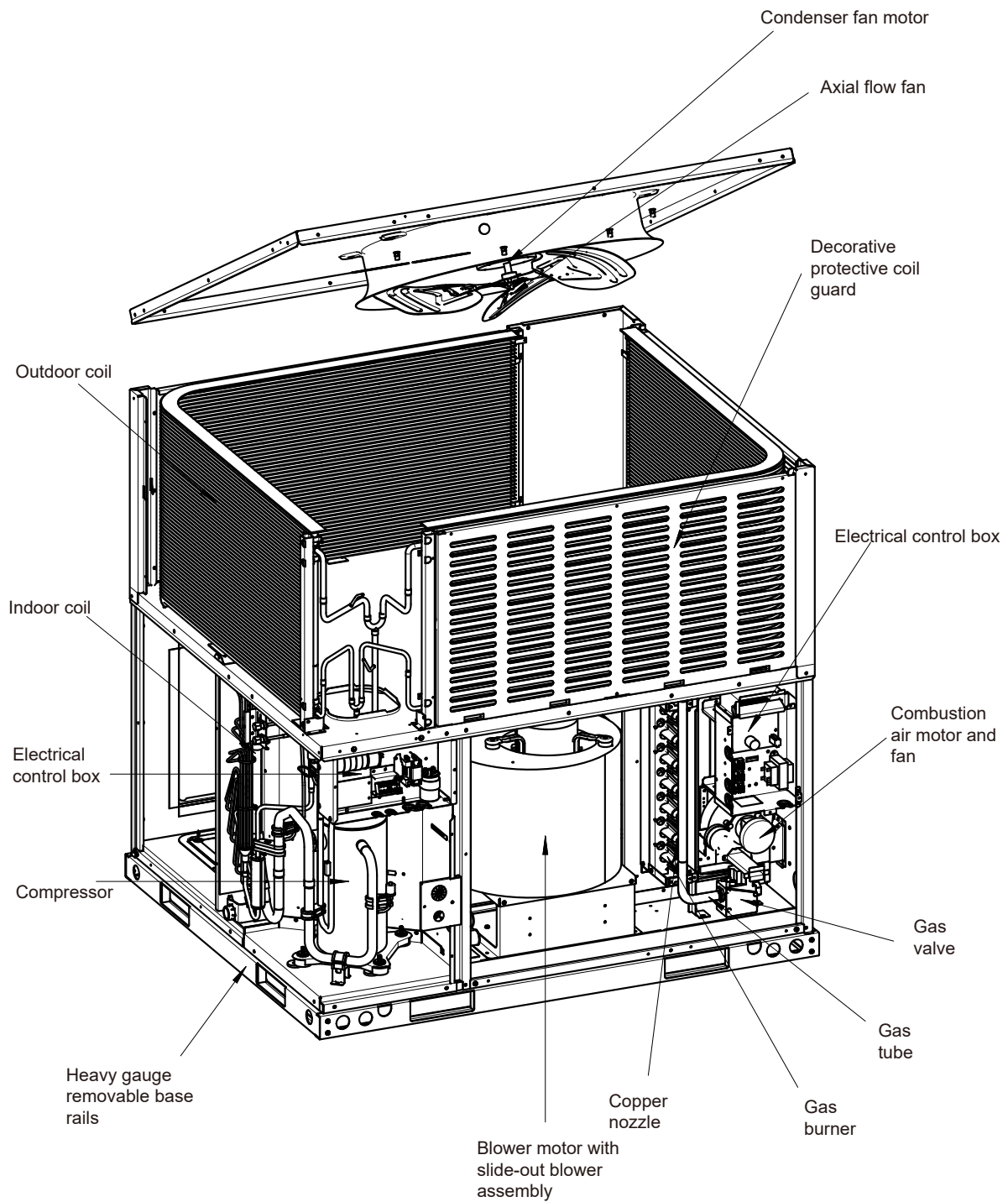


Fig. 2-3 Component Location

\* The above figure for reference purpose only.

### 3 INSTALLATION

#### **⚠ WARNING**

Disconnect all power to the unit before starting maintenance.  
Failure to do so can cause electrical shock resulting in personal injury or death.

#### **⚠ WARNING**

Ensure the unit is mounted securely.

Install the unit in accordance with The American National Standard Z223.1-latest edition booklet entitled "National Fuel Gas Code", and the requirements or codes of the local utility or other authority having jurisdiction.

Unit should be installed in accordance with national and local safety codes, including but not limit to ANSI/NFPA No. 70 or Canadian Electrical Code Part 1, C22.1, local plumbing and wastewater codes and any other applicable codes.

Additional helpful publications available from the "National Fire Protection Association" are: NFPA-90A - installation of Air Conditioning and Ventilating Systems 1985 or latest edition. NFPA-90B - Warm Air Heating and Air Conditioning Systems 1984.

#### **⚠ WARNING**

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).

Do not pierce or burn.

Be aware that refrigerants might not contain an odour.

### 3.1 Pre-installation Check-points

Before installation, carefully check the following:

1. For rooftop installation, be sure the structure has enough strength to support the weight of unit.
2. Clearances and provision for servicing.
3. Power supply and wiring.
4. Gas supply and piping.
5. Air duct connections and sizing.
6. Drain facilities and connections.
7. Location for minimum noise and vibration.
8. The blue foam are for transportation protection and needs to be taken out

### 3.2 Location Considerations

The metal parts of the unit may be subject to rust or deterioration in adverse environmental conditions. This oxidation could shorten the equipment's useful life. Salt spray, fog or mist in seacoast areas, sulphur or chlorine from lawn watering systems, and various chemical contaminants from industries such as paper mills and petroleum refineries are especially corrosive.

**If the unit is to be installed in an area where contaminants are likely to be a problem, give special attention to the equipment location and exposure:**

1. Avoid having lawn sprinkler heads spray directly on the unit cabinet.
2. In coastal areas locate the unit on the side of the building away from the waterfront.
3. Shielding by a fence or shrubs may give some protection.
4. Elevate the unit off its slab or base enough to allow air circulation and avoid holding water against the base pan.
5. Frequent washing of the cabinet, fan blade and coil with fresh water will remove most of the salt or other contaminants that build up on the unit.
6. Regular cleaning and waxing of the cabinet with a good automobile polish will provide some protection.

Several different types of protective coatings are offered in some areas. These coatings may provide some benefit, but the effectiveness of such coating materials cannot be verified by the equipment manufacturer. The best protection is frequent cleaning, maintenance and minimal exposure to contaminants.

### 3.3 Outside Installation

#### **⚠ WARNING**

This unit is designed certified for outdoor installation only.

Installation inside any part of a structure can result in inadequate unit performance as well as property damage. Installation inside can also cause recirculation of flue products into the conditioned space resulting in personal injury or death.

Typical outdoor installation is shown in Figure 3-2:

1. Select a location where external water drainage cannot collect around unit.
2. Locate unit where operating sounds will not disturb owner or neighbors.
3. The location of the unit should allow proper access for inspection and servicing.
4. Locate unit so roof runoff water does not pour directly on the unit. Provide gutter or other shielding at roof level. Do not locate unit in an area where excessive snow drifting may occur or accumulate.
5. Provide a concrete slab extending 3" beyond all four sides of the unit. The slab should be sufficiently high enough above grade to prevent surface water from entering the unit. The slab should be isolated from the foundation wall.
6. Pitch the slab approximately 1/2" so that the unit will be pitched toward the drain. See Figure 3-3.
7. It is essential that the unit be elevated above the base pad to allow for defrost water runoff, condensate drainage, and possible refreezing or condensate. Route condensation off the base pad to an area that will not become slippery and result in personal injury. Important: Do not interfere with opening in bottom of unit.
8. Where snowfall is anticipated, the height of the unit above the ground level must be considered. Mount unit high enough to be above average area snowfall to prevent snow from blocking the outdoor coil, to allow condensate runoff, and to allow combustion air to enter the combustion air inlet.

### 3.4 Attaching Exhaust and Combustion Air Inlet Hoods

Do not operate this unit without the exhaust and combustion air inlet hood properly installed. These hoods are shipped in a carton in the return air compartment inside the unit and must be attached the unit is installed. See Fig. 2-1.

To attach exhaust and combustion air inlet hood:

1. Remove 3 screws securing filter access panel and remove filter access panel. For location of filter access panel, see Fig. 3-4.
2. Remove both exhaust and combustion air inlet hoods from their carton, located inside the return air compartment.
3. Attach filter access panel.
4. Attach the combustion air inlet hood and the exhaust hood with 4 and 6 screws as shown in Fig. 2-1. Screws are in parts bag shipped in the burner compartment.
5. Vent the unit using the flue exhaust hood, as supplied from the factory, without alteration addition. The only exception is with factory approved additions. Consult your local unity or other authority having jurisdiction for accepted venting techniques.

### 3.5 Cover Panel Installation / Conversion Procedure

All unit sizes have return and discharge openings for both horizontal and downflow configurations, and are factory shipped with all downflow duct openings covered, HORIZONTAL is factory shipped.

#### HORIZONTAL TO DOWNFLOW

1. Remove screws and covers from the supply and return bottom section.
2. Install gasket (supplied with parts bag) around perimeter of cover on the insulate side.
3. Secure covers to the side of the unit using existing screws and those supplied in the parts bag. See Fig. 3-4.
4. Seal duct covers with silicone caulk.

#### DOWNFLOW TO HORIZONTAL

1. Remove screws and covers from the supply and return bottom section.
2. Install gasket (factory shipped) around perimeter of cover on the insulate side.
3. Secure covers to the bottom of the unit using existing screws and those supplied in the parts bag. See Fig. 3-5

### ⚠ WARNING

This unit must not be installed directly on wood flooring, Class A, Class B or Class C roof covering materials, or any other combustion structure except as specified in Fig. 3-1. Failure to adhere to this warning can cause a fire or explosion resulting in property damage, personal injury or death.

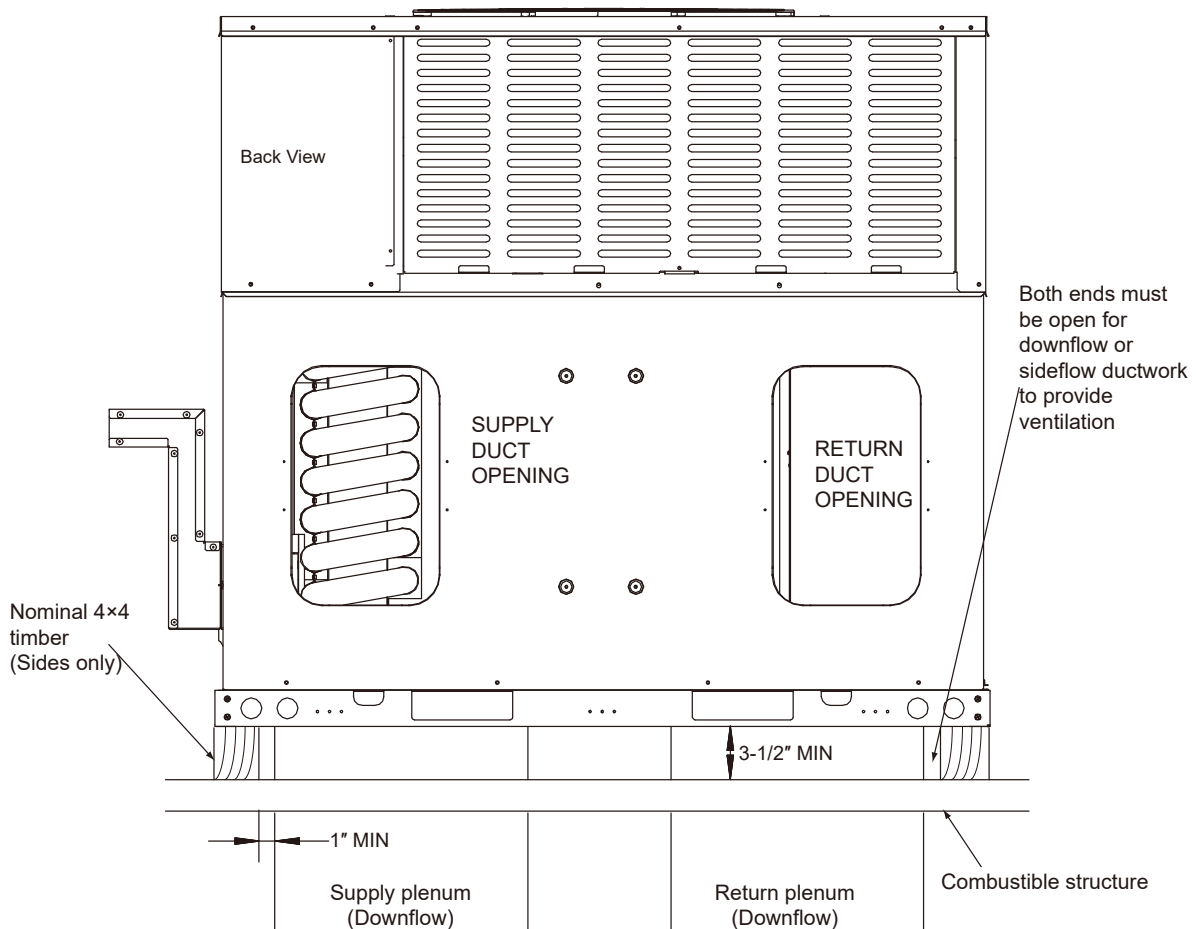


Fig. 3-1 Exception to non-combustible flooring requirement

\* The above figure for reference purpose only.

### 3.6 Clearance

All units require certain clearance for proper operation and service.  
Refer to Table 3-1 for the minimum clearances required for construction, servicing and proper unit operation.

| Direction        | Distance (in)   | Direction           | Distance (in)   |
|------------------|-----------------|---------------------|-----------------|
| Top <sup>1</sup> | 60              | Right               | 24              |
| Front            | 48              | Left                | 12 <sup>4</sup> |
| Rear             | 18 <sup>2</sup> | Bottom <sup>3</sup> | 0               |

Table 3-1: Unit Clearance

Duct clearance: 1 inch clearance for all sides of air supply duct.

1. Units must be installed outdoors. Over hanging structure or shrubs should not obscure condenser air discharge outlet.
2. The minimum clearance is without an economizer/fresh air damper. For distance with Economizer/fresh air damper, please refer to the relevant Install requirement.
3. Units may not be installed on combustible floors made from wood or class A, B or C roof covering materials.
4. If Economizer/fresh air damper is used, a 24" minimum clearance is required on left side of unit.

#### NOTICE

For units applied with a roof curb, the minimum clearance may be reduced from 1 inch to 1/2 inch between combustible roof curb material and this supply air duct.

### 3.7 Rigging and Handling

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.

#### CAUTION

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.

Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

#### CAUTION

All panels must be secured in place when the unit is lifted.  
The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

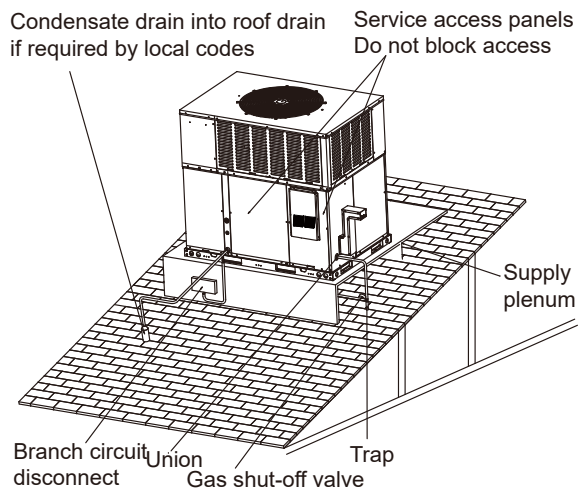
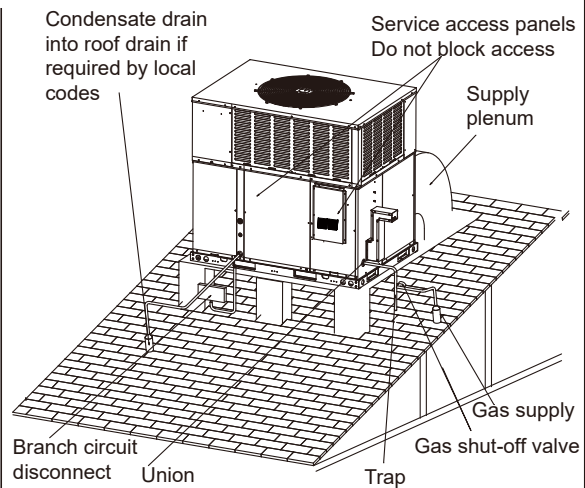
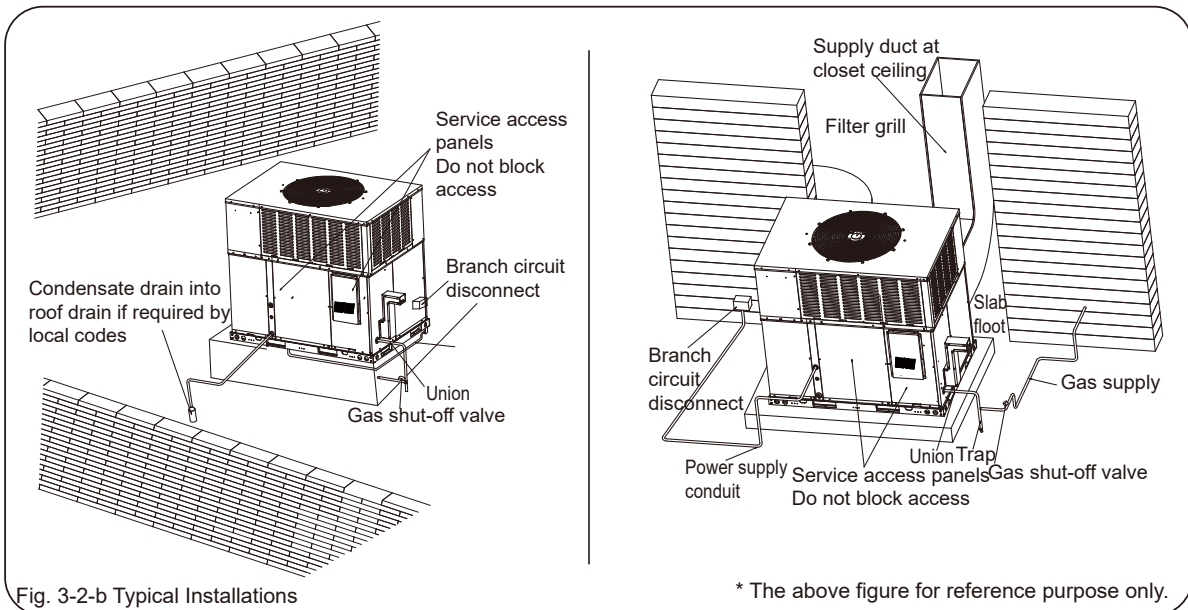


Fig. 3-2-a Typical Installations

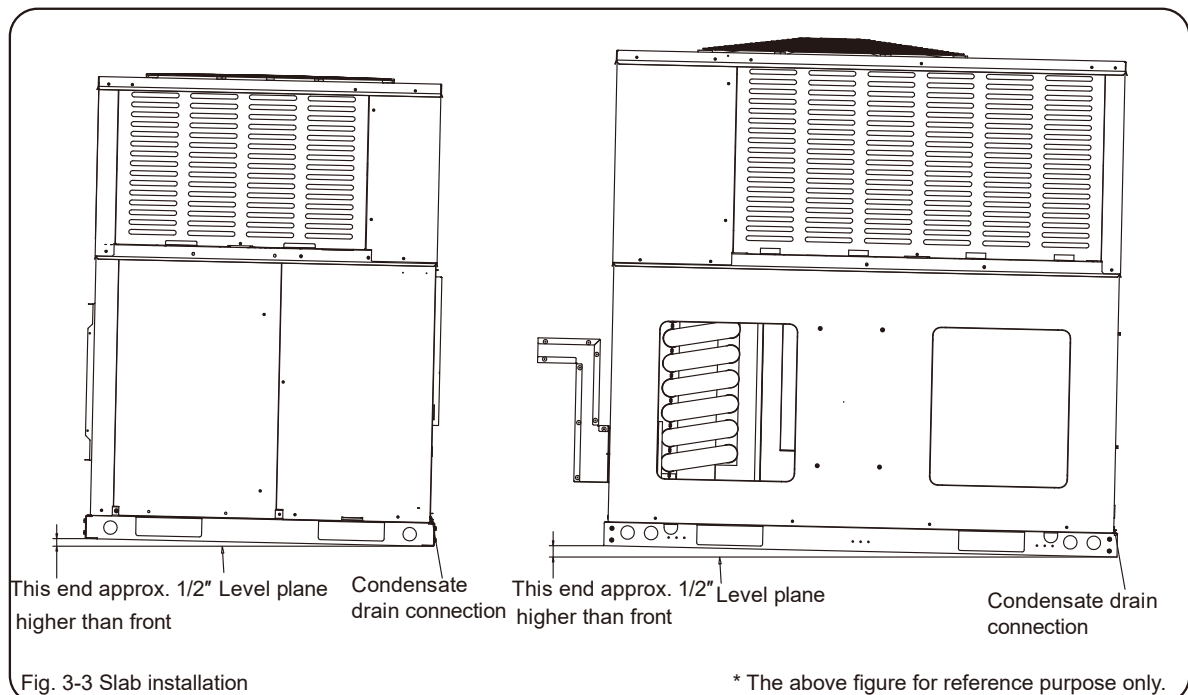


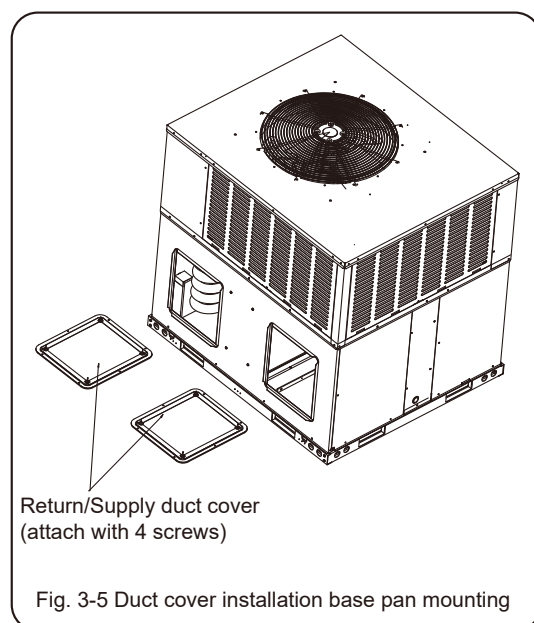
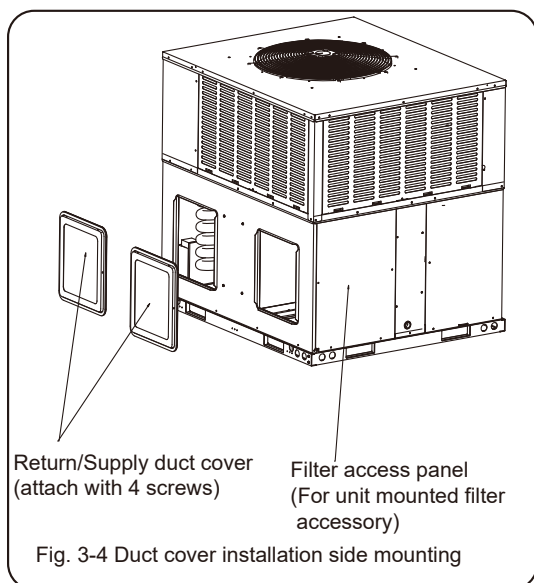
\* The above figure for reference purpose only.



## NOTICE

If you have a unit with electric heaters that has an inlet or outlet duct going through the building structure, it must be placed on a noncombustible base. This base should be designed so that, once the unit is installed, there are no gaps that would allow flames or hot gases from a fire below to reach the space above. If the unit is to be installed on a structure made of combustible material, the base must ensure that there is enough space between the unit, plenum, and duct, and the supporting structure. Any spacers needed to maintain this clearance should be attached to the unit's base and should extend at least 76 mm (3 in) below the top of the supporting structure. However, for units designed for mobile homes, this distance can be as little as 19 mm (3/4 in).





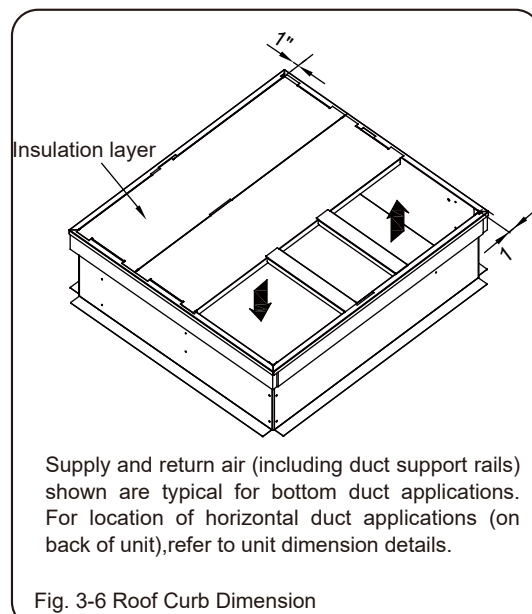
\* The above figure for reference purpose only.

### 3.8 Roof Curb

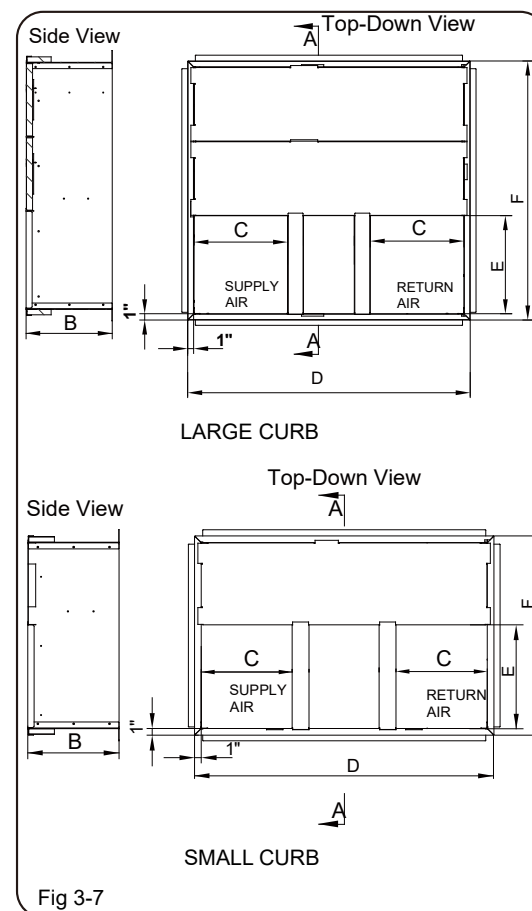
In applications using roof curbs, the unit must be placed on the curb so that the front of the unit is close to the curb.  
(See Fig. 3-6 Roof Curb Dimension)

#### NOTICE

For units applied with a roof curb, the minimum clearance may be reduced from 1 inch to 1/2 inch between combustible roof curb material and this supply air duct.



\* The above figures for reference purpose only.



\* The above figures for reference purpose only.

| Dimensions(Inches) | CURB           |                |
|--------------------|----------------|----------------|
|                    | LARGE          | SMALL          |
| "B" in[mm]         | 14-1/4 [362]   | 14-1/4 [362]   |
| "C" in[mm]         | 15-1/4 [387]   | 14 [356]       |
| "D" in[mm]         | 46-1/16 [1170] | 46-1/16 [1170] |
| "E" in[mm]         | 16 [406]       | 16 [406]       |
| "F" in[mm]         | 42-3/16 [1070] | 30-5/8 [778]   |

Table 3-2

### 3.9 Ductwork

Ductwork should be made and sized by installer and in accordance with Air Manual from Conditioning Contractors of America and local codes.

#### NOTICE

On ductwork exposed to outside air conditioning space, use at least 2" of insulation and a vapor barrier. Flexible joint may be used to reduce noise.

These units are adaptable to horizontal use as well as rear supply and return air duct openings. To convert to downflow, use the steps as shown in 3.5.

A closed return duct system shall be used. This shall not preclude use of economizers or ventilation air intake.

#### ⚠ CAUTION

When fastening duct work to the side duct flanges on the unit, insert the screws through the duct flanges only. DO NOT insert the screws through the casing. Outdoor duct work must be insulated and waterproofed.

#### NOTICE

Be sure to note supply and return openings. Refer to Fig. 3-1, Fig. 3-2, Fig. 3-3, Fig. 3-4, Fig. 3-5, Fig. 3-6, Fig. 3-7 and Fig. 4-1 for information concerning rear and bottom supply and return air duct openings.

### 3.10 Return Air

#### ⚠ WARNING

Never allow products of combustion to the flue products to enter the return air ductwork, or the circulating air supply.

All return ductwork must be adequately sealed and secured to the furnace with sheet metal screws, and joints taped. All other duct joints must be secured with approved connections and sealed airtight.

Failure to prevent products of combustion from being circulated into the living space can create potentially hazardous conditions, including carbon monoxide poisoning that could result in personal injury or death.

### 3.11 Filters

The installer must install field supplied filters in the return air duct. A field installed filter grille is recommended for easy and convenient access to the filters for periodic inspection and cleaning. Filters must have adequate face area for the rated air quantity of the unit. Filter material should be used in accordance with UL 900 or CAN/ULC-S111See air delivery tables for recommended filter size.

## 4 GAS SUPPLY, CONDENSATE DRAIN AND PIPING

### 4.1 Gas Connection

**IMPORTANT:** Connect this unit only to gas supplied by a commercial utility.

1. Install gas piping in accordance with local codes and regulations of the local utility company. In the absence of local codes, the installation must conform to the specifications of the National Fuel Gas Code, ANSI Z223.1 - latest edition.

#### NOTICE

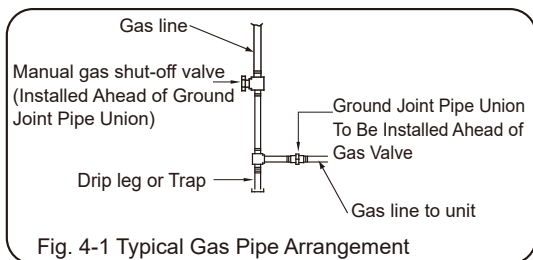
The use of flexible gas connectors is not permitted. If local codes allow the use of a corrugated stainless steel flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance.

#### NOTICE

The Commonwealth of Massachusetts requires the gas shut-off valve to be a T-handle gas cock.

2. Connect the gas line to the gas pipe inlet opening provided into the 1/2" inlet valve. See Fig. 4-1 for typical piping.
3. Size the gas line to the furnace adequate enough to prevent undue pressure drop and never less than 1/2" nominal pipe size.
4. Install a drip leg or sediment trap in the gas supply line as close to the unit as possible.
5. Install an outside ground joint union to connect the gas supply to the control assembly at the burner tray. Unions may not be installed inside the unit.
6. Gas valves have been factory installed. Install a manual gas valve where local codes specify a shut-off valve outside the unit casting.
7. Make sure piping is tight. A pipe compound resistant to the action of liquefied petroleum gases must be used at all threaded pipe connections.
8. **IMPORTANT:** Any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

**IMPORTANT:** Disconnect the furnace and its individual shutoff valve the gas supply piping during any pressure testing of that system at test pressures in excess of 1/2 psig or isolate the system from the gas supply piping system by closing its individual manual shutoff valve during any pressures equal to or less than 1/2 psig.



## ⚠ WARNING

### FIRE OR EXPLOSION HAZARD

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

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

**TO CHECK FOR GAS LEAKS, USE A SOAP AND WATER SOLUTION OR OTHER APPROVED METHOD. DO NOT USE AN OPEN FLAME.**

**IMPORTANT:** Check the rating plate to make certain the appliance is equipped to burn the type of gas supplied. After installing this equipment, ensure the gas control valve does not experience excessive gas supply pressure. In making gas connections, avoid strains as they may cause noise and damage the controls. A backup wrench is required to be used on the valve to avoid damage.

The capacity of gas pipe of different diameters and lengths in CFH with pressure drop of 0.5 in and specific gravity of 0.60 (natural gas) are shown in Table 4-1.

Table 4-1: Natural gas pipe capacity table (CFH - Cubic Feet of Gas Per Hour)

| Nominal iron pipe size (in) | Equivalent length of pipe (ft) |      |     |     |     |     |     |     |
|-----------------------------|--------------------------------|------|-----|-----|-----|-----|-----|-----|
|                             | 10                             | 20   | 30  | 40  | 50  | 60  | 70  | 80  |
| 1/2                         | 132                            | 92   | 73  | 63  | 56  | 50  | 46  | 43  |
| 3/4                         | 278                            | 190  | 152 | 130 | 115 | 105 | 96  | 90  |
| 1                           | 520                            | 350  | 285 | 245 | 215 | 195 | 180 | 170 |
| 1-1/4                       | 1050                           | 730  | 590 | 500 | 440 | 400 | 370 | 350 |
| 1-1/2                       | 1600                           | 1100 | 890 | 760 | 670 | 610 | 560 | 530 |

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

$$CFH = \frac{\text{Furnace input (Btu/h)}}{\text{Heating Value of Gas (Btu/Cubic Foot)}}$$

The gas input of the furnace is marked on the furnace rating plate.

The heating value of the gas (Btu/Cubic Ft.) may be determined by consulting the local natural gas utility or the L.P. gas supplier.

## 4.2 Conversion

## ⚠ WARNING

This unit is equipped at the factory for use on Natural Gas only.

Conversion to LP Gas requires a special kit which is included with the unit. **DO NOT BURN ANY LIQUID FUEL OR SOLID FUEL IN THIS UNIT.** Burning any unapproved fuel will result in damage to this unit heat exchanger, which could result in fire, Carbon Monoxide poisoning, explosion, personal injury, property damage or death.

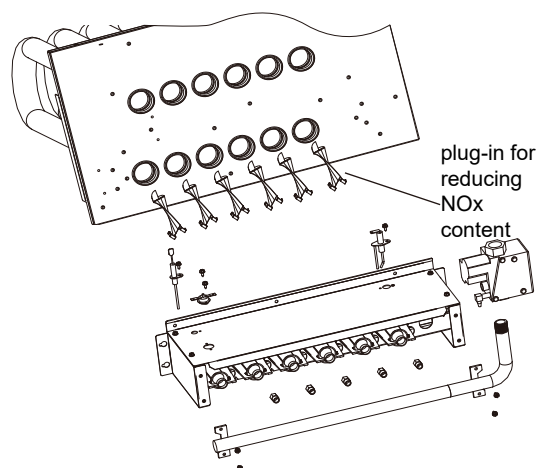
Convert the valve to use liquefied petroleum (LP) gas by replacing the pressure regulator spring with the conversion kit spring. This LP kit spring allows the regulator to maintain the proper manifold pressure for LP gas. The correct burner LP orifices are included in the kit.

**NOTE:** The LP conversion kit is included with the unit. **See Conversion Kit Index shipped with unit for proper LP kit number. Furnace conversion to LP gas must be performed by a qualified technician.**

Table 4-2: LP gas pipe capacity table (CFH - Cubic Feet of Gas Per Hour)

| Nominal iron pipe size (in) | Equivalent length of pipe (ft) |      |      |      |      |      |      |      |      |      |      |      |  |  |
|-----------------------------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|--|--|
|                             | 10                             | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 125  | 150  |  |  |
| 1/2                         | 275                            | 189  | 152  | 129  | 114  | 103  | 96   | 89   | 83   | 78   | 69   | 63   |  |  |
| 3/4                         | 567                            | 393  | 315  | 267  | 237  | 217  | 196  | 182  | 173  | 162  | 146  | 132  |  |  |
| 1                           | 1071                           | 732  | 590  | 504  | 448  | 409  | 378  | 346  | 322  | 307  | 275  | 252  |  |  |
| 1-1/4                       | 2205                           | 1496 | 1212 | 1039 | 913  | 834  | 771  | 724  | 677  | 630  | 567  | 511  |  |  |
| 1-1/2                       | 3307                           | 2299 | 1858 | 1559 | 1417 | 1275 | 1181 | 1086 | 1023 | 976  | 866  | 787  |  |  |
| 2                           | 6221                           | 4331 | 3465 | 2992 | 2646 | 2394 | 2205 | 2047 | 1921 | 1811 | 1606 | 1496 |  |  |

Example (LP): Input Btu requirement of unit, 150000  
Equivalent length of pipe, 60 ft. = 3/4" IPS



\* The above figure is for reference purpose only.

Fig. 4-2 Burner and Gas Valve Arrangement

### 4.3 Adjusting or Checking Furnace Input

| Manifold Gas Pressure |            |             |            |             |
|-----------------------|------------|-------------|------------|-------------|
| MODEL                 | Range      |             | Orifice    |             |
|                       | Nature Gas | Propane Gas | Nature Gas | Propane Gas |
| 024060                | 3.1"W.C.   | 9.6"W.C.    | 51         | 59          |
| 030060                | 3.1"W.C.   | 9.6"W.C.    | 51         | 59          |
| 036090                | 3.2"W.C.   | 10.5"W.C.   | 51         | 59          |
| 042090                | 3.3"W.C.   | 9.5"W.C.    | 49         | 56          |
| 048090                | 3.3"W.C.   | 9.5"W.C.    | 49         | 56          |
| 060090                | 3.3"W.C.   | 9.5"W.C.    | 49         | 56          |
| 060110                | 3.45"W.C.  | 10.0"W.C.   | 49         | 56          |

Supply and manifold pressure taps are located on the gas valve body 1/8" N.P.T.

Use a properly calibrated manometer gauge for accurate gas pressure readings.

Only small variations in the gas flow should be made by means of the pressure regulator adjustment. Furnaces functioning on LP gas must be set by means of the tank or branch supply regulators. The furnace outlet pressure should be set at 10" W.C. at the gas control valve.

To adjust the pressure regulator, remove the regulator cap and turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. Then replace the regulator cap securely.

Any necessary major changes in the gas flow rate should be made by changing the size of the burner orifices. To change orifice spuds, shut off the manual main gas valve and remove the gas manifold.

For elevations up to 2000 feet, rating plate input rating apply. For high altitudes (elevations over 2000 feet), see conversion kit index for derating and orifice spud sizes.

**Check of input is important to prevent over-firing of the furnace beyond its designated input, NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE. Use the following formula to determine input rate.**

$$\text{C.F.H. Required} = \frac{\text{Heating value of gas (Btu/Cubic ft)} \times 3600}{\text{Time of Seconds (for 1 Cubic ft.) of gas}}$$

Start the furnace and measure the time required to burn one cubic foot of gas. Prior to checking the furnace input, make certain that all other gas appliances are shut off, with the exception of pilot burners. Time the meter with only the furnace in operation.

**IMPORTANT NOTE FOR ALL ALTITUDES ABOVE 2000 FEET:** The main burner orifices in your furnace and in these kits are sized for the nameplate input and intended for installations at elevations up to 2000 feet in the USA or Canada, or for elevations of 2000-4500 feet in Canada if the unit has been derated at the factory. For elevations above 2000 feet **IN THE USA ONLY** (see ANSI-Z223.1), the burner orifices must be sized to reduce the input 4% for each 1000 feet above sea level.

**NOTICE:** Derating of the heating input for high altitude in the field is unlawful in Canada (refer to CAN/CGA 2.17). Units installed in altitudes greater than 2000 feet must be shipped from the factory or from a factory authorized conversion station with the heating input derated by 10% so as to operate properly in altitudes from 2000-4500 feet.

### 4.4 Condensate Drain

The evaporator coil condensate drain ends with a threaded 3/4" nominal PVC stub. A trap is built in for proper condensate drainage and to prevent debris from being drawn into the unit. Do not connect the drain to a closed sewer line. It is recommended that a PVC cement not be used so that the drain line can be easily cleaned in the future.

**IMPORTANT:** Do not install an external trap. Doing so can cause improper drainage of the condensate and result in flooding within the unit.

## 5 WIRING

### 5.1 Power Supply

#### ⚠ WARNING

Turn off the main electrical power at the branch circuit disconnect closest to the unit before attempting any wiring. Failure to do so can cause electrical shock resulting in personal injury or death.

1. All wiring should be made in accordance with the National Electrical Code. Consult the local power company to determine the availability of sufficient power to operate the unit. Check the voltage at power supply to make sure it corresponds to the unit's rated voltage requirement. Install a branch circuit disconnect near the rooftop, in accordance with the N.E.C., C.E.C. or local codes.
2. It is important that proper electrical power is available at the unit. Voltage should not vary more than 10% from that stamped on the unit nameplate. On three phase units, phases must be balanced within 3%.
3. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from Table 5-1 using the circuit ampacity found on the unit rating plate. Use the smallest wire size allowable in Table 5-1 from the disconnect to unit. The disconnect must be in sight and readily accessible of the unit.

Table 5-1: Branch circuit copper wire size (in)

|                         |     | Branch circuit ampacity |    |    |    |    |    |    |    |
|-------------------------|-----|-------------------------|----|----|----|----|----|----|----|
|                         |     | 15                      | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| Supply wire length (ft) | 200 | 6                       | 4  | 4  | 4  | 3  | 3  | 2  | 2  |
|                         | 150 | 8                       | 6  | 6  | 4  | 4  | 4  | 3  | 3  |
|                         | 100 | 10                      | 8  | 8  | 6  | 6  | 6  | 4  | 4  |
|                         | 50  | 14                      | 12 | 10 | 10 | 8  | 8  | 6  | 6  |

#### NOTES:

1. Wire size based on 60°C rated wire insulation and 30°C Ambient Temp.
2. For more than 3 conductors in a raceway or cable, see the N.E.C. for derating the ampacity of each conductor. When installed, the unit must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, if an external electrical source is utilized.

**IMPORTANT:** This unit is approved for use with copper conductors only connected to unit contactor. Warranty may be jeopardized if aluminum wire is connected to unit contactor.

**Special instructions apply for power wiring aluminum conductors: Warranty is void if connections are not made per instructions.**

Attach a length (6" or more) of recommended size copper wire to the unit contactor terminals L1 and L3 for single phase.

Select the equivalent aluminum wire size from the tabulation below:

Splice copper wire pigtails to aluminum wire with U.L. recognized connectors for copper-aluminum splices. Please exercise the following instructions very carefully to obtain a positive and lasting connection:

1. Strip insulation from aluminum conductor.
2. Coat the stripped end of the aluminum wire with the recommended inhibitor, and wire brush the aluminum surface through inhibitor.  
INHIBITORS: Brundy-Pentex "A"; Alcoa-No. 2EJC; T & B-KPOR Shield.
3. Clean and recoat aluminum conductor with inhibitor.
4. Make the splice using the below listed wire nuts or split bolt connectors.
5. Coat the entire connection with inhibitor and wrap with electrical insulating tape.

| AWG Copper Wire Size | AWG Aluminum Wire Size | Connector Type and Size (or equivalent) |
|----------------------|------------------------|-----------------------------------------|
| #12                  | #10                    | T & B Wire Nut PT2                      |
| #10                  | #8                     | T & B Wire Nut PT3                      |
| #8                   | #6                     | Sherman Split Bolt TSP6                 |
| #6                   | #4                     | Sherman Split Bolt TSP4                 |
| #4                   | #2                     | Sherman Split Bolt TSP2                 |

## 5.2 Hook-up

To wire unit, refer to the following Fig. 5-1.

Wiring to be done in the field between the unit and devices not attached to the unit, or between separate devices which are field installed and located, shall conform with the temperature limitation for Type T wire [63°F rise] when installed in accordance with the manufacturer's instructions.

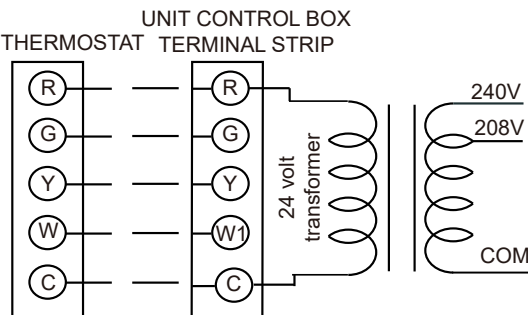


Fig. 5-1 Typical Field Control Wiring Diagram

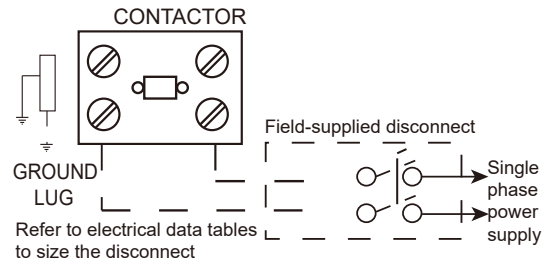


Fig. 5-2 Typical Field Power Wiring Diagram

## 5.3 Internal Wiring

**IMPORTANT:** Some single phase units are equipped with a single pole contactor. Caution must be exercised when servicing as only one leg of the power supply is broken with the contactor.

Some models are equipped with an electronically commutated blower motor which is constantly energized unless the main unit disconnect is in the off position.

A diagram of the internal wiring of this unit is located under the electrical box cover and in this manual. If any of the original wire as supplied with the appliance must be replaced, the wire gauge and insulation must be the same as the original wiring.

Transformer is factory wired for 230 volt on 208/230 volt models and must be changed to 208 volt applications. See unit wiring diagram for 208 volt wiring.

## 5.4 Thermostat

The room thermostat must be specifically designed to control package gas electric units.

## 6 FURNACE SECTION CONTROLS AND IGNITION SYSTEM

### 6.1 Normal Furnace Operating Sequence

This unit is equipped with an integrated direct spark ignition control.

1. The thermostat calls for gas heat.
2. The control board will run a self check to verify that the limit control and manual reset overtemperature control are closed and that the pressure switch is open. If so, the induced draft blower (inducer) begin a prepurge cycle.
3. The air proving negative pressure switch closes.
4. 15 seconds after the pressure switch closes, the gas valve opens and the spark is initiated for a 7 second trial for ignition.
5. Burners ignite and flame sensor proves all burners have lit.
6. The circulating air blower is energized after 45 seconds.
7. The control board enters a normal operation loop in which all safetycontrols are monitored continuously.
8. Thermostat is satisfied and opens.

9. The gas valve is de-energized and closes, shutting down the burner flame.
10. The control board will de-energize the inducer after a five second post purge.
11. The circulating air blower BLOWER-LOW is de-energized after max. 90 seconds.
  - The integrated control board has a three times ignition system.
  - After a total of 3 trials for ignition without sensing main burner flame, the system goes into lockout mode.
  - After 1 hour, the ignition control repeats the prepurge and ignition cycles for 3 tries and then goes into lockout mode again.
  - It continues this sequence of cycles and lockout each hour until ignition is successful or power is interrupted.
  - During the lockout mode, neither the spark ignition control or gas valve will be energized until the system is reset by turning the thermostat to the "OFF" position or interrupting the electrical power to the unit for 3 seconds or longer.
  - The induced draft blower and main burner will shut off when the thermostat is satisfied.
  - The circulating air blower will start and run on the heating speed if the thermostat fan switch is in the "ON" position.

The integrated furnace control is equipped with diagnostic LED. The LED is lit continuously when there is power to the control without a call for heat. If the LED is not lit, there is either no power to the control or there is an internal component failure within the control, and the control should be replaced.

If the control detects the following failures, the LED will flash for designated failure detections.

- 2 Flashes: Failed to detect or sustain flame, system locked out.
- 3 Flashes: Pressure switch or induced draft blower problem detected.
- 4 Flashes: High limit or auxiliary limit open.
- 5 Flashes: Flame sensed and gas valve not energized or flame sensed with no "W" signal.
- 6 Flashes: Overtemperature switch open.
- 7 Flashes: Thermostat miswired; W1 and W2 swapped.  
Slow flash rate: Normal, call for heat.

## 6.2 Operating Instructions

This appliance is equipped with a direct spark intermittent ignition device. This device lights the main burners each time the room thermostat (closes) calls for gas heat. See operating instructions on the back of the furnace/controls access panel.

### **⚠ WARNING**

Do not attempt to manually light this furnace with a match or any open flame. Attempting to do so can cause an explosion or fire resulting in property damage, personal injury or death.

## 6.3 To Start The Furnace

1. Set the thermostat to its lowest setting.
2. Turn off all electric power to the appliance.
3. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

4. Remove control door.
5. Turn the gas valve to the "OFF" position.
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow B in the safety information on the Operating Instructions located on the back of the controls/access panel. If you don't smell gas, go to the next step.
7. Turn the gas valve to the "ON" position.
8. Replace the control door.
9. Turn on all electric power to the appliance.
10. Set the thermostat to the desired setting.
11. If the appliance will not operate, follow the instructions below to shut down the furnace.

### **⚠ WARNING**

The spark ignitor and ignition lead from the ignition control are high voltage. Keep hands or tools away to prevent electrical shock. Shut off electrical power before servicing any of the controls. Failure to adhere to this warning can result in personal injury or death.

The initial start-up on a new installation may require the control system to be energized in some time until any air has bled through the system and fuel gas is available at the burners.

## 6.4 To Shut Down Furnace

1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control door.
4. Move gas valve to the "OFF" position.
5. Replace control door.

### **⚠ WARNING**

Should overheating occur or the gas supply fail to shut off. Shut off the Manual Gas valve to the appliance before shutting off the electrical supply. Failure to do so can result in an explosion or fire causing property damage, severe personal injury or death.

## 6.5 Burners

Burners for these units have been designed so that field adjustment is not required. Burners are tray-mounted and accessible for easy cleaning when required.

## 6.6 Manual Reset Overtemperature Control

A manual reset overtemperature control is located on the burner shield. This device senses blockage in the heat exchanger or insufficient combustion air. This shuts off the main burners if excessive temperatures occur in the burner compartment.

Operation of this control indicates an abnormal condition. Therefore, the unit should be examined by a qualified installer, service agency, or the gas supplier before being placed back into operation.

## **⚠ WARNING**

DO NOT JUMPER THIS DEVICE! Do not reset the overtemperature control without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation. Failure to do so can result in Carbon Monoxide poisoning or death. Replace this control only with the identical replacement part.

### **6.7 Pressure Switch**

This furnace has a negative pressure switch for sensing a blocked exhaust or a failed induced draft blower. It is normally closed when the induced draft blower starts, indicating air flow through the combustion chamber.

### **6.8 Limit Control**

The supply air high temperature limit cut-off is set at the factory and cannot be adjusted. It is calibrated to prevent the air temperature leaving the furnace from exceeding the maximum outlet air temperature. **WARNING: DO NOT JUMPER THIS DEVICE! Replace this control only with the identical replacement part.**

## **7 SYSTEM OPERATING INFORMATION**

### **7.1 Advise the Customer**

1. Keep the air filters clean. The heating system operates better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This reduces the heating load on the system.
4. Avoid excessive use of exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6. Except for the mounting platform, keep all combustible articles three feet from the unit and exhaust system.
7. **IMPORTANT:** Replace all blower doors and compartment after servicing the unit. Do not operate the unit without all panels and doors securely in place.
8. Do not allow snow or other debris to accumulate in the vicinity of the appliance.

### **7.2 Furnace Section Maintenance**

The unit's furnace should operate for many years without excessive scale build-up in flue passageways; and it should have a qualified installer, service agency, or gas supplier annually inspect the flue passageways, the exhaust system and the burners for continued safe operation, paying particular attention to deterioration from corrosion or other sources.

If during inspection the flue passageways and exhaust system are determined to require cleaning, the following procedures should be followed (by a qualified installer, service agency, or gas supplier):

1. Turn off the electrical power to the unit and set the thermostat to the lowest temperature.
2. Shut off the gas supply to the unit either at the meter or at manual valve in the supply piping.

## **⚠ WARNING**

Label all wires prior to disconnection when servicing controls.

Wiring errors can cause improper and dangerous operation resulting in fire, electrical shock, property damage, personal injury or death.

3. Remove the furnace controls access panel and the control box cover.
4. Disconnect the gas supply piping from the gas valve.
5. Disconnect the wiring to the induced draft blower motor, gas valve, flame sensor, and flame roll-out control, and igniter cable. Mark all wires disconnected for proper reconnection.
6. Remove the screws (4) connecting the burner tray to the heat exchanger mounting panel.
7. Remove the burner tray and the manifold assembly from the unit.
8. Remove the screws (4) connecting the induced draft blower to the collector box and screws (16) connecting the collector box to the heat exchanger mounting panel. Remove the induced draft blower and the collector box from the unit.
9. Remove the turbulators from inside the heat exchangers by inserting the blade of a screwdriver under the locking tabs. Pop the tabs out of the expanded grooves of the heat exchanger. Slide the turbulators out of the heat exchangers.
10. Direct a water hose into the outlet of the heat exchanger top. Flush the inside of each heat exchanger tube with water. Blow out each tube with air to remove excessive moisture.
11. Reassemble (steps 1 through 10 in reverse order). **Be careful not to strip out the screw holes used to mount the collector box and inducer blower. Replace inducer blower gasket and collector box gasket with factory replacements if damaged.**

## **⚠ WARNING**

Holes in the exhaust transition or heat exchanger can cause toxic fumes to enter the home. The exhaust transition or heat exchanger must be replaced if they have holes or cracks in them.

Failure to do so can cause Carbon Monoxide poisoning resulting in personal injury or death.

The manufacturer recommends that a qualified installer, service agency or the gas supplier visually inspect the burner flames for the desired flame appearance at the beginning of the heating season and approximately midway in heating season.

The manufacturer also recommends that a qualified installer, service agency or the gas supplier clean the flame sensor with steel wool at the beginning of the heating season.

## **⚠ WARNING**

Disconnect main electrical power to the unit before attempting maintenance. Failure to do so may result in electrical shock or severe personal injury or death.

### **7.3 Lubrication**

**IMPORTANT:** DO NOT attempt to lubricate the bearings on the blower motor or the induced draft blower motor. Addition of lubricants can reduce the motor life and void the warranty.

The blower motor and induced draft blower motor are prelubricated by the manufacturer and do not require further attention.

A qualified installer, service agency or the gas supplier must periodically clean the motors to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean because dirty filters can restrict air flow and the motor depends upon sufficient air flowing across and through it to prevent overheating.

### **7.4 Cooling Section Maintenance**

It is recommended that at the beginning of each cooling season a qualified installer or service agency inspect and clean the cooling section of this unit. The following areas should be addressed: evaporator coil, condenser coil, condenser fan motor and venturi area.

#### **To inspect the evaporator coil:**

1. Remove the filter access panel and the blower/evaporator coil access panel.

## **⚠ WARNING**

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation resulting in fire, electrical shock, property damage, personal injury or death.

2. Unplug the wires from the circulating air blower and the limit control.  
Remove the two screws and slide the blower out of the unit sideways.
3. Shine a flashlight on the evaporator coil (both sides) and inspect for accumulation of lint, insulation, etc.
4. If coil requires cleaning, follow the steps shown below.

#### **Cleaning Condenser Coil**

1. Remove screws from condenser fan grille assembly and lay grille over on the unit top panel.
2. Remove the controls access panel and the control box cover.
3. Disconnect the outdoor fan motor wiring from the compressor contactor and capacitor. Remove the strain relief in the bulkhead and pull the fan motor wires through. Set grille assembly to the side.
4. Remove the screws that secure the unit top to the unit. Remove the top and set the unit top to the side.

5. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
6. The recommended cleaning method for microchannel condenser coils is pressurized water or air with an on-pinpoint nozzle and an ECU of at least 180 with pressure no greater than 600psi. To minimize the risk of coil damage, approach the cleaning of the coil with the pressure washer aimed perpendicular to the face of the coil using cleaning. Optimum clearance between the spray nozzle and the microchannel coil is 1"–3".

#### **Cleaning Evaporator Coil, Drain Pan, Condensate Drain, Condenser Fan, Circulation Air Blower and Venturi**

1. Remove the screws from the filter access panel and the blower/evaporator coil access panel from the unit. Remove the filter access panel and the blower/evaporator coil access panel.
2. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the Coil fins.
3. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water.  
**IMPORTANT:** Do not use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.
4. Inspect the drain pan and condensate drain at the same time the evaporator coil is checked. Clean the drain pan by flushing with water and removing any matters of obstructions which may be present.
5. Flush the drain tube with water. If the drain tube is blocked, it can usually be cleared with high pressure water.
6. The venturi should also be inspected for items of obstruction such as collections of grass, dirt or spider webs. Remove any that are present.
7. Inspect the circulating air blower wheel and motor for accumulation of lint, dirt or other obstruction and clean if necessary. Inspect the blower motor mounts and the blower housing for loose mounts or other damage. Repair or replace it necessary.

#### **Re-assembly**

1. Place the condenser coil protective grille back on unit and replace all screws.
2. Place top panel back on unit and replace all screws.
3. Set condenser fan grille assembly on top of the unit with the fan on top and the motor wires on the venturi side. Run the fan motor wires through the bulkhead and pull wires through the hole on the bottom of the control box on the left side and into the control box. Reconnect fan motor wires per the wiring diagram attached to the back of the control box cover.
4. Replace wire strain relief in bulkhead after the slack is pulled out of the wires on the fan side. This will assure wires will not be damaged by the fan during unit operation.
5. Turn the condenser fan grille assembly over and into the recess in the unit top. Secure the grille to the unit with the four long #8 screws removed earlier.
6. Replace the circulating air blower, making sure that all wires are properly reconnected per the unit wiring diagram.
7. Replace the filter and blower/evaporator coil access panels.
8. Replace the control box cover and controls access panel.
9. Restore electrical power to the unit and check for proper operation, especially the condenser fan motor.

## 7.5 Replacement Parts

Contact your local distributor for a complete parts list.

## 7.6 Wiring Diagrams

Refer to the appropriate wiring diagram included in this manual.

## 7.7 Charging

Refer to the appropriate charge chart included in this manual.

## 7.8 Blower Motor Speed Taps

After determining necessary CFM and speed tap data, follow the steps below to change speeds.

1. Remove control door.
2. Please refer to the Table 10-1 & Table 10-2 and wiring diagram for the proper location of the wire on the speed tap block of the indoor blower motor to obtain the speed you have chosen.
3. After adjusting the wires accordingly, replace control door.

## 8 OPERATION

Most single phase units are equipped with Permanent Split Capacitor (PSC) motors (no start relay or start capacitor). It is important that such systems be off for a minimum of 5 minutes before restarting to allow equalization of pressures. Do not move the thermostat to cycle unit without waiting five minutes. To do so may cause the compressor to stop on an automatic open overload device or blow a fuse. Poor electrical service can cause nuisance tripping in overloads or blow fuses.

**IMPORTANT:** The compressor has an internal overload protector. Under some conditions, it can take up to 2 hours for this overload to reset. Make sure overload has had time to reset before condensing the compressor. The control allows the blower to operate for up to 90 seconds after the thermostat is satisfied.

## 8.1 Control System Operation

### 1. Heating mode

The wall thermostat "calls for heat," closing the R--to--W circuit. The furnace control performs a "NORMAL FURNACE OPERATING SEQUENCE".

### 2. Cooling mode

In the cooling mode, The thermostat closes the R--to--G--and--Y circuits. The thermostat will energize the compressor contactor and the indoor blower relay. the blower motor will operate on BLOWER-SINGLE/Hi speed. After the thermostat is satisfied, the compressor is de-energized and the cool mode delay-to-fan-off period begins. After the delay-to-fan-off period ends, the circulator fan is de-energized. The indoor blower can be operated continuously by setting the thermostat fan switch at the "ON" position.

### 3. Fan mode

When the circuit R--to--G is closed by the thermostat, the blower motor will operate on BLOWER-LOW speed. If the thermostat fan switch is moved to the ON position, the circulator fan will be energized. When the fan switch is returned to the AUTO position, the circulator fan will be de-energized.

## 8.2 Fan Delay Adjustment

As shipped, the circulator blower fan will remain on for 90 seconds after the gas valve closes. When a call for cooling occurs, the circulator fan comes on and remains on for 80 seconds after the call for cooling ends. During normal heating operation, the circulator fan will come on approximately 45 seconds after the gas valve opens.



## 9 PHYSICAL DATA

Table 9-1: 13.4 SEER2 Physical Data

| Component                     | Models                        |                               |                               |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                               | PGE0242301134060              | PGE0302301134060              | PGE0362301134090              |
| Nominal Tonnage               |                               |                               |                               |
| Cooling Capacity (95F), Btu/h | 2.0                           | 2.5                           | 3.0                           |
| EER2                          | 22800                         | 28400                         | 34000                         |
| SEER2                         | 11                            | 11                            | 11                            |
| Nominal CFM                   | 13.4                          | 13.4                          | 13.4                          |
| System power (kW)             | 720                           | 940                           | 1050                          |
| Refrigerant type              | 2.07                          | 2.58                          | 3.09                          |
| Refrigerant charge (lb-oz)    | R454B                         | R454B                         | R454B                         |
| GAS HEATING PERFORMANCE       | 2-10                          | 2-12                          | 2-14                          |
| Heating input (Btu/h)         |                               |                               |                               |
| Heating output (Btu/h)        | 60000                         | 60000                         | 90000                         |
| Temperature rise range (F)    | 48000                         | 48000                         | 72000                         |
| AFUE (%)                      | 30-70                         | 30-70                         | 40-70                         |
| Steady state efficiency (%)   | 81                            | 81                            | 81                            |
| No. burners                   | 8 <sup>1</sup> / <sub>1</sub> | 8 <sup>1</sup> / <sub>1</sub> | 8 <sup>1</sup> / <sub>1</sub> |
| No. stages                    | 1                             | 1                             | 1                             |
| Gas connection pipe size (in) | 1/2" NPT                      | 1/2" NPT                      | 1/2" NPT                      |
| DIMENSIONS (in)               |                               |                               |                               |
| Length                        | 50-11/16                      | 50-11/16                      | 50-11/16                      |
| Width                         | 35-1/16                       | 35-1/16                       | 35-1/16                       |
| Height                        | 46-7/16                       | 46-7/16                       | 46-7/16                       |
| OPERATING WT. (lb)            | 422                           | 432                           | 444                           |
| COMPRESSORS                   |                               |                               |                               |
| Type                          | Rotary                        | Rotary                        | Rotary                        |
| Quantity                      | 1                             | 1                             | 1                             |
| CONDENSER COIL DATA           |                               |                               |                               |
| Type                          | Microchannel                  | Microchannel                  | Microchannel                  |
| Coil Width (in)               | 0.63                          | 0.63                          | 0.63                          |
| Face Area (ft²)               | 14.11                         | 14.11                         | 14.11                         |
| Rows                          | 1+1                           | 1+1                           | 1+1                           |
| FPI                           | 23                            | 23                            | 23                            |
| EVAPORATOR COIL DATA          |                               |                               |                               |
| Coil Type                     | Aluminum Pipe/Aluminum Fin    | Aluminum Pipe/Aluminum Fin    | Aluminum Pipe/Aluminum Fin    |
| Face area (ft²)               | 3.96                          | 3.96                          | 3.96                          |
| Rows                          | 4                             | 4                             | 4                             |
| Fins per inch                 | 17                            | 17                            | 17                            |
| Tube diameter                 | 9/32                          | 9/32                          | 9/32                          |
| Circuitry type                | interlaced                    | interlaced                    | interlaced                    |
| Refrigerant control           | Orifice                       | Orifice                       | Orifice                       |
| CONDENSER FAN DATA            |                               |                               |                               |
| Fan diameter (in)             | 23-5/8                        | 23-5/8                        | 23-5/8                        |
| Type                          | Prop                          | Prop                          | Prop                          |
| Drive type                    | Direct                        | Direct                        | Direct                        |
| No. speeds                    | 1                             | 1                             | 1                             |
| Number of motors              | 1                             | 1                             | 1                             |
| Motor HP each                 | 1/12 (60W)                    | 1/6 (110W)                    | 1/6 (110W)                    |
| RPM                           | 840                           | 840                           | 840                           |
| Nominal total CFM             | 2970                          | 2770                          | 2970                          |
| DIRECT DRIVE EVAP FAN DATA    |                               |                               |                               |
| Quantity                      | 1                             | 1                             | 1                             |
| Fan Size (in)                 | 10×10                         | 10×10                         | 10×10                         |
| Type                          | Centrifugal                   | Centrifugal                   | Centrifugal                   |
| No. speeds                    | 1                             | 1                             | 1                             |
| Motor HP each                 | 1/2 (375W)                    | 1/2 (375W)                    | 1/2 (375W)                    |

Table 9-1: 13.4 SEER2 Physical Data

| Component                     | Models                     |                            |                            |                            |
|-------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|                               | PGE0422301134090           | PGE0482301134090           | PGE0602301134090           | PGE0602301134110           |
| Nominal Tonnage               |                            |                            |                            |                            |
| Cooling Capacity (95F), Btu/h | 3.5                        | 4.0                        | 5.0                        | 5.0                        |
| EER2                          | 40000                      | 47000                      | 57000                      | 57000                      |
| SEER2                         | 11                         | 11                         | 11                         | 11                         |
| Nominal CFM                   | 13.4                       | 13.4                       | 13.4                       | 13.4                       |
| System power (kW)             | 1200                       | 1650                       | 1850                       | 1850                       |
| Refrigerant type              | 3.64                       | 4.27                       | 5.18                       | 5.18                       |
| Refrigerant charge (lb-oz)    | R454B                      | R454B                      | R454B                      | R454B                      |
| GAS HEATING PERFORMANCE       | 3-12                       | 3-12                       | 3-12                       | 3-12                       |
| Heating input (Btu/h)         |                            |                            |                            |                            |
| Heating output (Btu/h)        | 90000                      | 90000                      | 90000                      | 110000                     |
| Temperature rise range (F)    | 72000                      | 72000                      | 72000                      | 88000                      |
| AFUE (%)                      | 35-65                      | 25-55                      | 25-55                      | 30-60                      |
| Steady state efficiency (%)   | 81                         | 81                         | 81                         | 81                         |
| No. burners                   | 8 <sup>1</sup>             | 8 <sup>1</sup>             | 8 <sup>1</sup>             | 7                          |
| No. stages                    | 1                          | 1                          | 1                          | 1                          |
| Gas connection pipe size (in) | 1/2" NPT                   | 1/2" NPT                   | 1/2" NPT                   | 1/2" NPT                   |
| DIMENSIONS (in)               |                            |                            |                            |                            |
| Length                        | 51-9/16                    | 51-9/16                    | 51-9/16                    | 51-9/16                    |
| Width                         | 44-13/16                   | 44-13/16                   | 44-13/16                   | 44-13/16                   |
| Height                        | 49-3/4                     | 49-3/4                     | 49-3/4                     | 49-3/4                     |
| OPERATING WT. (lb)            | 539                        | 560                        | 557                        | 562                        |
| COMPRESSORS                   |                            |                            |                            |                            |
| Type                          | Rotary                     | Scroll                     | Scroll                     | Scroll                     |
| Quantity                      | 1                          | 1                          | 1                          | 1                          |
| CONDENSER COIL DATA           |                            |                            |                            |                            |
| Type                          | Microchannel               | Microchannel               | Microchannel               | Microchannel               |
| Coil Width (in)               | 0.63                       | 0.63                       | 0.63                       | 0.63                       |
| Face Area (ft <sup>2</sup> )  | 20.17                      | 20.17                      | 20.17                      | 20.17                      |
| Rows                          | 1+1                        | 1+1                        | 1+1                        | 1+1                        |
| FPI                           | 23                         | 23                         | 23                         | 23                         |
| EVAPORATOR COIL DATA          |                            |                            |                            |                            |
| Coil Type                     | Aluminum Pipe/Aluminum Fin | Aluminum Pipe/Aluminum Fin | Aluminum Pipe/Aluminum Fin | Aluminum Pipe/Aluminum Fin |
| Face area (ft <sup>2</sup> )  | 6.1                        | 6.1                        | 6.1                        | 6.1                        |
| Rows                          | 4                          | 4                          | 4                          | 4                          |
| Fins per inch                 | 17                         | 17                         | 17                         | 17                         |
| Tube diameter                 | 9/32                       | 9/32                       | 9/32                       | 9/32                       |
| Circuitry type                | interlaced                 | interlaced                 | interlaced                 | interlaced                 |
| Refrigerant control           | Orifice                    | Orifice                    | Orifice                    | Orifice                    |
| CONDENSER FAN DATA            |                            |                            |                            |                            |
| Fan diameter (in)             | 26-3/8                     | 26-3/8                     | 26-3/8                     | 26-3/8                     |
| Type                          | Prop                       | Prop                       | Prop                       | Prop                       |
| Drive type                    | Direct                     | Direct                     | Direct                     | Direct                     |
| No. speeds                    | 1                          | 1                          | 1                          | 1                          |
| Number of motors              | 1                          | 1                          | 1                          | 1                          |
| Motor HP each                 | 1/3 (290W)                 | 1/3 (290W)                 | 1/3 (290W)                 | 1/3 (290W)                 |
| RPM                           | 1070                       | 1070                       | 1070                       | 1070                       |
| Nominal total CFM             | 5170                       | 5170                       | 5170                       | 5170                       |
| DIRECT DRIVE EVAP FAN DATA    |                            |                            |                            |                            |
| Quantity                      | 1                          | 1                          | 1                          | 1                          |
| Fan Size (in)                 | 11×10-5/8                  | 11×10-5/8                  | 11×10-5/8                  | 11×10-5/8                  |
| Type                          | Centrifugal                | Centrifugal                | Centrifugal                | Centrifugal                |
| No. speeds                    | 1                          | 1                          | 1                          | 1                          |
| Motor HP each                 | 1/2 (375W)                 | 3/4 (560W)                 | 3/4 (560W)                 | 3/4 (560W)                 |

## 10 AIRFLOW PERFORMANCE

Airflow performance data is based on cooling performance with a coil and no filter in place. Use this performance table for appropriate unit size, external static applied to unit and allow operation within the minimum and maximum limits shown in table below for both cooling and electric heat operation.

Table 10-1 Indoor Airflow Performance - 230 Volts

| Model Number | Motor Speed     |           | External Static Pressure-Inches in H <sub>2</sub> O (kPa) |          |          |          |          |          |          |          |          |          |          |
|--------------|-----------------|-----------|-----------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|              |                 |           | 0[0]                                                      | 0.1[.02] | 0.2[.05] | 0.3[.07] | 0.4[.10] | 0.5[.12] | 0.6[.15] | 0.7[.17] | 0.8[.20] | 0.9[.23] | 1.0[.25] |
| 24           | Low (Tap1)      | SCFM      | /                                                         | 859      | 785      | 694      | 625      | /        | /        | /        | /        | /        | /        |
|              |                 | Current/A | /                                                         | 1.24     | 1.27     | 1.32     | 1.35     | /        | /        | /        | /        | /        | /        |
|              |                 | Power/W   | /                                                         | 134      | 138      | 144      | 149      | /        | /        | /        | /        | /        | /        |
|              | Middle-1 (Tap2) | SCFM      | /                                                         | /        | /        | /        | 887      | 806      | 753      | 695      | 646      | /        | /        |
|              |                 | Current/A | /                                                         | /        | /        | /        | 2.02     | 2.07     | 2.12     | 2.13     | 2.17     | /        | /        |
|              |                 | Power/W   | /                                                         | /        | /        | /        | 234      | 241      | 246      | 244      | 249      | /        | /        |
|              | Middle-2 (Tap3) | SCFM      | /                                                         | /        | /        | /        | /        | /        | /        | 869      | 816      | 769      | 723      |
|              |                 | Current/A | /                                                         | /        | /        | /        | /        | /        | /        | 2.80     | 2.84     | 2.88     | 2.92     |
|              |                 | Power/W   | /                                                         | /        | /        | /        | /        | /        | /        | 335      | 341      | 346      | 351      |
|              | Middle-3 (Tap4) | SCFM      | /                                                         | /        | /        | /        | /        | /        | /        | /        | /        | 882      | 836      |
|              |                 | Current/A | /                                                         | /        | /        | /        | /        | /        | /        | /        | /        | 3.38     | 3.43     |
|              |                 | Power/W   | /                                                         | /        | /        | /        | /        | /        | /        | /        | /        | 412      | 418      |
|              | High (Tap5)     | SCFM      | /                                                         | /        | /        | /        | /        | /        | /        | /        | /        | /        | 884.6    |
|              |                 | Current/A | /                                                         | /        | /        | /        | /        | /        | /        | /        | /        | /        | 3.67     |
|              |                 | Power/W   | /                                                         | /        | /        | /        | /        | /        | /        | /        | /        | /        | 445      |
| 30           | Low (Tap1)      | SCFM      | 927                                                       | 859      | 785      | /        | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Current/A | 1.2                                                       | 1.24     | 1.27     | /        | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Power/W   | 129                                                       | 134      | 138      | /        | /        | /        | /        | /        | /        | /        | /        |
|              | Middle-1 (Tap2) | SCFM      | /                                                         | 1066     | 1001     | 945      | 887      | 806      | 753      | /        | /        | /        | /        |
|              |                 | Current/A | /                                                         | 1.90     | 1.94     | 1.98     | 2.02     | 2.07     | 2.12     | /        | /        | /        | /        |
|              |                 | Power/W   | /                                                         | 218      | 224      | 228      | 234      | 241      | 246      | /        | /        | /        | /        |
|              | Middle-2 (Tap3) | SCFM      | /                                                         | /        | /        | 1105     | 1051     | 998      | 925      | 869      | 816      | 769      | /        |
|              |                 | Current/A | /                                                         | /        | /        | 2.61     | 2.65     | 2.70     | 2.75     | 2.80     | 2.84     | 2.88     | /        |
|              |                 | Power/W   | /                                                         | /        | /        | 310      | 316      | 322      | 329      | 335      | 341      | 346      | /        |
|              | Middle-3 (Tap4) | SCFM      | /                                                         | /        | /        | /        | /        | 1109     | 1056     | 986      | 933      | 882      | 836      |
|              |                 | Current/A | /                                                         | /        | /        | /        | /        | 3.19     | 3.23     | 3.29     | 3.34     | 3.38     | 3.43     |
|              |                 | Power/W   | /                                                         | /        | /        | /        | /        | 387      | 393      | 400      | 407      | 412      | 418      |
|              | High (Tap5)     | SCFM      | /                                                         | /        | /        | /        | /        | /        | /        | 1064     | 990      | 934      | 885      |
|              |                 | Current/A | /                                                         | /        | /        | /        | /        | /        | /        | 3.63     | 3.67     | 3.65     | 3.67     |
|              |                 | Power/W   | /                                                         | /        | /        | /        | /        | /        | /        | 444      | 455      | 443      | 445      |
| 36           | Low (Tap1)      | SCFM      | 927                                                       | /        | /        | /        | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Current/A | 1.2                                                       | /        | /        | /        | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Power/W   | 129                                                       | /        | /        | /        | /        | /        | /        | /        | /        | /        | /        |
|              | Middle-1 (Tap2) | SCFM      | 1127                                                      | 1066     | 1001     | 945      | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Current/A | 1.87                                                      | 1.90     | 1.94     | 1.98     | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Power/W   | 213                                                       | 218      | 224      | 228      | /        | /        | /        | /        | /        | /        | /        |
|              | Middle-2 (Tap3) | SCFM      | 1265                                                      | 1217     | 1162     | 1105     | 1051     | 998      | 925      | /        | /        | /        | /        |
|              |                 | Current/A | 2.47                                                      | 2.52     | 2.57     | 2.61     | 2.65     | 2.70     | 2.75     | /        | /        | /        | /        |
|              |                 | Power/W   | 292                                                       | 299      | 305      | 310      | 316      | 322      | 329      | /        | /        | /        | /        |
|              | Middle-3 (Tap4) | SCFM      | /                                                         | 1314     | 1263     | 1213     | 1159     | 1109     | 1056     | 986      | 933      | /        | /        |
|              |                 | Current/A | /                                                         | 3.01     | 3.06     | 3.10     | 3.14     | 3.19     | 3.23     | 3.29     | 3.34     | /        | /        |
|              |                 | Power/W   | /                                                         | 363      | 369      | 375      | 381      | 387      | 393      | 400      | 407      | /        | /        |
|              | High (Tap5)     | SCFM      | /                                                         | 1347     | 1305     | 1283     | 1256     | 1196     | 1144     | 1064     | 990      | 934      | 907      |
|              |                 | Current/A | /                                                         | 3.68     | 3.67     | 3.66     | 3.66     | 3.66     | 3.66     | 3.63     | 3.67     | 3.65     | 6.34     |
|              |                 | Power/W   | /                                                         | 452      | 451      | 450      | 449      | 448      | 449      | 444      | 455      | 443      | 463      |

Table 10-1 Indoor Airflow Performance - 230 Volts

| Model Number | Motor Speed     |           | External Static Pressure-Inches in H <sub>2</sub> O (kPa) |          |          |          |          |          |          |          |          |          |          |
|--------------|-----------------|-----------|-----------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|              |                 |           | 0[0]                                                      | 0.1[.02] | 0.2[.05] | 0.3[.07] | 0.4[.10] | 0.5[.12] | 0.6[.15] | 0.7[.17] | 0.8[.20] | 0.9[.23] | 1.0[.25] |
| 42           | Middle-1 (Tap2) | SCFM      | 1328                                                      | 1242     | 1166     | 1090.8   | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Current/A | 1.35                                                      | 1.42     | 1.49     | 1.56     | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Power/W   | 153                                                       | 161      | 169      | 178      | /        | /        | /        | /        | /        | /        | /        |
|              | Middle-2 (Tap3) | SCFM      | 1450                                                      | 1372     | 1300     | 1232     | 1160     | 1088     | /        | /        | /        | /        | /        |
|              |                 | Current/A | 1.70                                                      | 1.77     | 1.84     | 1.91     | 2.00     | 2.08     | /        | /        | /        | /        | /        |
|              |                 | Power/W   | 195                                                       | 205      | 214      | 223      | 234      | 244      | /        | /        | /        | /        | /        |
|              | Middle-3 (Tap4) | SCFM      | 1581                                                      | 1515     | 1448     | 1384     | 1318     | 1252     | 1189     | 1122     | /        | /        | /        |
|              |                 | Current/A | 2.15                                                      | 2.23     | 2.31     | 2.38     | 2.47     | 2.55     | 2.65     | 2.74     | /        | /        | /        |
|              |                 | Power/W   | 254                                                       | 265      | 274      | 284      | 295      | 307      | 319      | 331      | /        | /        | /        |
|              | High (Tap5)     | SCFM      | /                                                         | 1569     | 1503     | 1439     | 1377     | 1314     | 1252     | 1184     | 1115     | 1065     | 1020     |
|              |                 | Current/A | /                                                         | 2.42     | 2.50     | 2.57     | 2.66     | 2.75     | 2.84     | 2.94     | 3.03     | 3.14     | 3.23     |
|              |                 | Power/W   | /                                                         | 288      | 299      | 309      | 320      | 332      | 344      | 356      | 369      | 384      | 387      |
| 48           | Middle-1 (Tap2) | SCFM      | 1437                                                      | 1359     | 1284     | 1210     | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Current/A | 1.8                                                       | 1.88     | 1.96     | 2.04     | /        | /        | /        | /        | /        | /        | /        |
|              |                 | Power/W   | 202                                                       | 212      | 223      | 233      | /        | /        | /        | /        | /        | /        | /        |
|              | Middle-2 (Tap3) | SCFM      | /                                                         | 1791     | 1728     | 1662     | 1602     | 1539     | 1475     | 1419     | 1364     | 1309     | 1252     |
|              |                 | Current/A | /                                                         | 3.44     | 3.52     | 3.61     | 3.69     | 3.78     | 3.87     | 3.96     | 4.05     | 4.15     | 4.25     |
|              |                 | Power/W   | /                                                         | 415      | 426      | 438      | 449      | 461      | 472      | 485      | 497      | 510      | 523      |
|              | Middle-3 (Tap4) | SCFM      | /                                                         | /        | /        | /        | /        | 1748     | 1691     | 1632     | 1575     | 1526     | 1474     |
|              |                 | Current/A | /                                                         | /        | /        | /        | /        | 4.74     | 4.84     | 4.93     | 5.03     | 5.12     | 5.23     |
|              |                 | Power/W   | /                                                         | /        | /        | /        | /        | 590      | 603      | 616      | 629      | 642      | 655      |
|              | High (Tap5)     | SCFM      | /                                                         | /        | /        | /        | /        | /        | 1787     | 1712     | 1660     | 1594     | 1536     |
|              |                 | Current/A | /                                                         | /        | /        | /        | /        | /        | 5.45     | 5.43     | 5.45     | 5.45     | 5.48     |
|              |                 | Power/W   | /                                                         | /        | /        | /        | /        | /        | 696      | 694      | 688      | 690      | 696      |
| 60           | Middle-2 (Tap3) | SCFM      | 1854                                                      | 1791     | 1728     | 1662     | 1602     | 1539     | /        | /        | /        | /        | /        |
|              |                 | Current/A | 3.36                                                      | 3.44     | 3.52     | 3.61     | 3.69     | 3.78     | /        | /        | /        | /        | /        |
|              |                 | Power/W   | 405                                                       | 415      | 426      | 438      | 449      | 461      | /        | /        | /        | /        | /        |
|              | Middle-3 (Tap4) | SCFM      | 2026                                                      | 1973     | 1918     | 1860     | 1802     | 1748     | 1691     | 1632     | 1575     | 1526     | /        |
|              |                 | Current/A | 4.26                                                      | 4.36     | 4.46     | 4.56     | 4.65     | 4.74     | 4.84     | 4.93     | 5.03     | 5.12     | /        |
|              |                 | Power/W   | 525                                                       | 538      | 551      | 565      | 578      | 590      | 603      | 616      | 629      | 642      | /        |
|              | High (Tap5)     | SCFM      | 2150                                                      | 2098     | 2044     | 1989     | 1932     | 1861     | 1787     | 1712     | 1660     | 1594     | 1536     |
|              |                 | Current/A | 5.07                                                      | 5.18     | 5.27     | 5.37     | 5.47     | 5.47     | 5.45     | 5.43     | 5.45     | 5.45     | 5.48     |
|              |                 | Power/W   | 640                                                       | 658      | 671      | 685      | 699      | 699      | 696      | 694      | 688      | 690      | 696      |

\* The above airflow data for reference only.

Table 10-2 Motor Speed from factory

| Model  | Cooling            |                          | Gas Heat           |                          | Blower Size | Motor HP | Temperature rise range(°F) |
|--------|--------------------|--------------------------|--------------------|--------------------------|-------------|----------|----------------------------|
|        | Usable Motor Speed | Motor Speed from factory | Usable Motor Speed | Motor Speed from factory |             |          |                            |
| 024060 | low                | Middle-1                 | low                | Low                      | 10×10       | 1/2      | 30-70                      |
|        | Middle-1           |                          | Middle-1           |                          |             |          |                            |
|        | Middle-2           |                          | Middle-2           |                          |             |          |                            |
|        | Middle-3           |                          | Middle-3           |                          |             |          |                            |
| 030060 | low                | Middle-2                 | low                | Low                      | 10×10       | 1/2      | 30-70                      |
|        | Middle-1           |                          | Middle-1           |                          |             |          |                            |
|        | Middle-2           |                          | Middle-2           |                          |             |          |                            |
|        | Middle-3           |                          | Middle-3           |                          |             |          |                            |
| 036090 | High               | Middle-3                 | High               | Middle-3                 | 10×10       | 1/2      | 40-70                      |
|        | low                |                          | low                |                          |             |          |                            |
|        | Middle-1           |                          | Middle-1           |                          |             |          |                            |
|        | Middle-2           |                          | Middle-2           |                          |             |          |                            |
| 042090 | Middle-3           | High                     | Middle-3           | Middle-2                 | 11 ×10-5/8  | 1/2      | 35-65                      |
|        | High               |                          | High               |                          |             |          |                            |
|        | Middle-1           |                          | Middle-1           |                          |             |          |                            |
|        | Middle-2           |                          | Middle-2           |                          |             |          |                            |
| 048090 | Middle-3           | Middle-3                 | Middle-3           | Middle-2                 | 11 ×10-5/8  | 3/4      | 25-55                      |
|        | High               |                          | High               |                          |             |          |                            |
|        | Middle-1           |                          | Middle-1           |                          |             |          |                            |
|        | Middle-2           |                          | Middle-2           |                          |             |          |                            |
| 060090 | Middle-3           | High                     | Middle-3           | Middle-2                 | 11×10-5/8   | 3/4      | 25-55                      |
|        | High               |                          | High               |                          |             |          |                            |
|        | Middle-2           |                          | Middle-2           |                          |             |          |                            |
| 060110 | Middle-3           | High                     | Middle-3           | Middle-3                 | 11×10-5/8   | 3/4      | 30-60                      |
|        | High               |                          | High               |                          |             |          |                            |
|        | Middle-2           |                          | Middle-2           |                          |             |          |                            |

- The air distribution system has the greatest effect on airflow. The duct system is totally controlled by the contractor. For this reason, the contractor should use only industry-recognized procedures.
- Each ton of cooling requires between 350 and 450 cubic feet of air per minute (CFM), or 400 CFM nominally.
- Duct design and construction should be carefully done. System performance can be lowered dramatically through bad planning or workmanship.
- Air supply diffusers must be selected and located carefully. They must be sized and positioned to deliver treated air along the perimeter of the space. If they are too small for their intended airflow, they become noisy. If they are not located properly, they cause drafts. Return air grilles must be properly sized to carry air back to the blower. If they are too small, they also cause noise.
- The installers should balance the air distribution system to ensure proper quiet airflow to all rooms in the home. This ensures a comfortable living space.
- An air velocity meter or airflow hood can give a reading of system CFM.
- When installation, installer should select the air speed according to the actual setting static pressure. Please refer to the Table 10-1 & Table 10-2.

## 11 TROUBLE SHOOTING

### **⚠ WARNING**

Components trouble shooting requires opening control box with power on. Use extreme care while working on this condition.

Check nameplate and this instruction when making wire connections.

Table 11-1 Trouble shooting chart

| SYMPTOM                                | POSSIBLE CAUSE                                                          | REMEDY                                                                                                                          |
|----------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Unit will not run                      | Power off or loose electrical connection                                | Check for correct voltage at compressor contactor in control box                                                                |
|                                        | Thermostat out of calibration-set too high                              | Reset                                                                                                                           |
|                                        | Failed contactor                                                        | Check for 24 volts at contactor coil - replace if contacts are open                                                             |
|                                        | Blown fuses                                                             | Replace fuses                                                                                                                   |
|                                        | Transformer defective                                                   | Check wiring - replace transformer                                                                                              |
|                                        | Interconnecting low voltage wiring damaged                              | Replace thermostat wiring                                                                                                       |
| Condenser fan runs, compressor doesn't | Run or start capacitor failed (single phase only)                       | Replace                                                                                                                         |
|                                        | Loose connection                                                        | Check for correct voltage at compressor - check & tighten all connection                                                        |
|                                        | Compressor stuck, grounded or open motor winding open internal overload | Wait at least 2 hours for overload to reset. If still open, replace the compressor.                                             |
|                                        | Low voltage condition                                                   | Determine cause and correct. At compressor terminals, voltages must be within 10% of rating plate volts when unit is operating. |
| Insufficient cooling                   | Improperly sized unit                                                   | Recalculate load                                                                                                                |
|                                        | Improper airflow                                                        | Check - should be approximately 400 CFM per ton.                                                                                |
|                                        | Incorrect refrigerant charge                                            | Charge per procedure attached to unit service panel.                                                                            |
|                                        | Air, non-condensable or moisture in system                              | Recover refrigerant, evacuate & recharge, add filter drier                                                                      |
|                                        | Incorrect voltage                                                       | Determine cause and correct. At compressor terminals, voltages must be within 10% of rating plate volts when unit is operating. |
| Compressor short cycles                | Incorrect voltage                                                       | At compressor terminals, voltage must be $\pm 10\%$ or nameplate marking when unit is operating.                                |
|                                        | Defective overload protector                                            | Replace - check for correct voltage                                                                                             |
|                                        | Refrigerant undercharge                                                 | Add refrigerant                                                                                                                 |

Table 11-1 Trouble shooting chart (Continued)

| SYMPTOM                                                                                           | POSSIBLE CAUSE                                                                                   | REMEDY                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compressor operates continuously                                                                  | Dirty air filter                                                                                 | Replace filter                                                                                                                                                                         |
|                                                                                                   | Unit undersized for load                                                                         | Decrease load or increase unit size                                                                                                                                                    |
|                                                                                                   | Thermostat temperature set too low                                                               | Reset thermostat                                                                                                                                                                       |
|                                                                                                   | Low refrigerant charge                                                                           | Locate leak, repair, and recharge                                                                                                                                                      |
|                                                                                                   | Air in system                                                                                    | Recover refrigerant, evacuate system, and recharge                                                                                                                                     |
| Registers sweat                                                                                   | Outdoor coil dirty or restricted                                                                 | Clean coil or remove restriction                                                                                                                                                       |
| High head-low vapor pressure                                                                      | Low evaporator airflow                                                                           | Increase speed of blower or reduce restriction - replace air filter                                                                                                                    |
|                                                                                                   | Restriction in liquid line, expansion device or filter drier                                     | Remove or replace defective component                                                                                                                                                  |
|                                                                                                   | Flow check piston size too small                                                                 | Change to correct size piston                                                                                                                                                          |
|                                                                                                   | Incorrect capillary tubes                                                                        | Change coil assembly                                                                                                                                                                   |
| High head-high or normal vapor pressure - Cooling mode                                            | TXV does not open                                                                                | Replace TXV                                                                                                                                                                            |
|                                                                                                   | Dirty condenser coil                                                                             | Clean coil                                                                                                                                                                             |
|                                                                                                   | Refrigerant overcharge                                                                           | Correct system charge                                                                                                                                                                  |
|                                                                                                   | Condenser fan not running                                                                        | Repair or replace                                                                                                                                                                      |
| Low head-high vapor pressures                                                                     | Air or non-condensable in system                                                                 | Recover refrigerant, evacuate & recharge                                                                                                                                               |
|                                                                                                   | Defective compressor valves                                                                      | Replace compressor                                                                                                                                                                     |
| Low vapor - cool compressor - iced evaporator coil                                                | Incorrect capillary tubes                                                                        | Replace coil assembly                                                                                                                                                                  |
|                                                                                                   | Low evaporator airflow                                                                           | Increase speed of blower or reduce restriction - replace air filter                                                                                                                    |
| High vapor pressure                                                                               | Operating below 65°F outdoors                                                                    | Add Low Ambient Kit                                                                                                                                                                    |
|                                                                                                   | Moisture in system                                                                               | Recover refrigerant - evacuate & recharge - add filter drier                                                                                                                           |
|                                                                                                   | Excessive load                                                                                   | Recheck load calculation                                                                                                                                                               |
|                                                                                                   | Defective compressor                                                                             | Replace                                                                                                                                                                                |
| Fluctuating head & vapor pressure                                                                 | TXV hunting                                                                                      | Check TXV bulb clamp - check air distribution on coil - replace TXV                                                                                                                    |
|                                                                                                   | Air or non-condensable in system                                                                 | Recover refrigerant - evacuate & recharge                                                                                                                                              |
| Gurgle or pulsing noise at expansion device or liquid line                                        | Air or non-condensable in system                                                                 | Recover refrigerant - evacuate & recharge                                                                                                                                              |
| Circulating air blower & inducer run continuously, compressor will not start                      | Manual reset overtemperature control tripped                                                     | Reset or replace                                                                                                                                                                       |
|                                                                                                   | Wire loose in limit circuit                                                                      | Check wiring                                                                                                                                                                           |
| Burners will not ignite                                                                           | Water in gas line                                                                                | Drain. Install drip leg.                                                                                                                                                               |
|                                                                                                   | No power to furnace                                                                              | Check power supply fuses, wiring or circuit breaker.                                                                                                                                   |
|                                                                                                   | No 24 volts power supply to control circuit                                                      | Check transformer.                                                                                                                                                                     |
|                                                                                                   | Miswired or loose connections                                                                    | Check all wiring and wire nut connections                                                                                                                                              |
|                                                                                                   | Misaligned spark electrodes                                                                      | Check flame ignition and sense electrode positioning. Adjust as necessary.                                                                                                             |
|                                                                                                   | No gas at main burners                                                                           | Check gas line for air. Purge as necessary. NOTE: After purging gas line of air, wait at least 5 minutes for any gas to dissipate before attempting to light unit.<br>Check gas valve. |
| Inadequate heating                                                                                | Dirty air filter                                                                                 | Clean or replace filter as necessary                                                                                                                                                   |
|                                                                                                   | Gas input to furnace too low                                                                     | Check gas pressure at manifold with that on unit nameplate                                                                                                                             |
|                                                                                                   | Unit undersized for application                                                                  | Replace with proper unit or add additional unit                                                                                                                                        |
|                                                                                                   | Restricted airflow                                                                               | Clean or replace filter, remove any restriction                                                                                                                                        |
| Poor flame characteristics                                                                        | Limit switch cycles main burners                                                                 | Check rotation of blower, temperature rise of unit. Adjust as necessary                                                                                                                |
|                                                                                                   | Incomplete combustion results in: Aldehyde odors, carbon monoxide, sooting flame, floating flame | Tighten all screws around burner compartment                                                                                                                                           |
|                                                                                                   |                                                                                                  | Cracked heat exchanger. Replace as necessary.                                                                                                                                          |
|                                                                                                   |                                                                                                  | Unit over-fired. Reduce input (change orifices or adjust gas line or manifold pressure).                                                                                               |
|                                                                                                   |                                                                                                  | Check burner alignment                                                                                                                                                                 |
| Both condenser fan and compressor startup and shutdown frequently (about three minutes per cycle) | Abnormal high discharge pressure caused the high pressure switch act                             | Inspect heat exchanger for blockage. Clean as necessary.                                                                                                                               |
|                                                                                                   |                                                                                                  | Reference to the remedy of 'High head-high or normal vapor pressure-cooling mode'.                                                                                                     |

## High Altitude

| Model  | NUMBER OF BURNERS | NATURAL GAS                                       |                                  |                                  |                                  |                                     |
|--------|-------------------|---------------------------------------------------|----------------------------------|----------------------------------|----------------------------------|-------------------------------------|
|        |                   | HEATING VALVE 1075 Btu/Cu.Ft.                     |                                  |                                  |                                  |                                     |
|        |                   | SPECIFIC GRAVITY 0.65/MANIFOLD PRESSURE @3.5"W.C. |                                  |                                  |                                  |                                     |
|        |                   | ELEVATION<br>0-2000'<br>(USA/CANADA)              | ELEVATION<br>4000'<br>(USA ONLY) | ELEVATION<br>6000'<br>(USA ONLY) | ELEVATION<br>8000'<br>(USA ONLY) | ELEVATION<br>2000-4500'<br>(CANADA) |
| 024060 | 5                 | 51                                                | 53                               | 53                               | 54                               | 51                                  |
| 030060 | 5                 | 51                                                | 53                               | 53                               | 54                               | 51                                  |
| 036090 | 7                 | 51                                                | 52                               | 53                               | 53                               | 51                                  |
| 042090 | 6                 | 49                                                | 50                               | 51                               | 52                               | 49                                  |
| 048090 | 6                 | 49                                                | 50                               | 51                               | 52                               | 49                                  |
| 060090 | 6                 | 49                                                | 50                               | 51                               | 52                               | 49                                  |
| 060110 | 7                 | 49                                                | 50                               | 51                               | 51                               | 49                                  |

| Model  | NUMBER OF BURNERS | LP GAS                                             |                                  |                                  |                                  |                                     |
|--------|-------------------|----------------------------------------------------|----------------------------------|----------------------------------|----------------------------------|-------------------------------------|
|        |                   | HEATING VALVE 2500 Btu/Cu.Ft.                      |                                  |                                  |                                  |                                     |
|        |                   | SPECIFIC GRAVITY 0.65/MANIFOLD PRESSURE @10.0"W.C. |                                  |                                  |                                  |                                     |
|        |                   | ELEVATION<br>0-2000'<br>(USA/CANADA)               | ELEVATION<br>4000'<br>(USA ONLY) | ELEVATION<br>6000'<br>(USA ONLY) | ELEVATION<br>8000'<br>(USA ONLY) | ELEVATION<br>2000-4500'<br>(CANADA) |
| 024060 | 5                 | 59                                                 | 63                               | 64                               | 64                               | 59                                  |
| 030060 | 5                 | 59                                                 | 63                               | 64                               | 64                               | 59                                  |
| 036090 | 7                 | 59                                                 | 62                               | 63                               | 64                               | 59                                  |
| 042090 | 6                 | 56                                                 | 59                               | 60                               | 61                               | 56                                  |
| 048090 | 6                 | 56                                                 | 59                               | 60                               | 61                               | 56                                  |
| 060090 | 6                 | 56                                                 | 59                               | 60                               | 61                               | 56                                  |
| 060110 | 7                 | 56                                                 | 58                               | 59                               | 60                               | 56                                  |

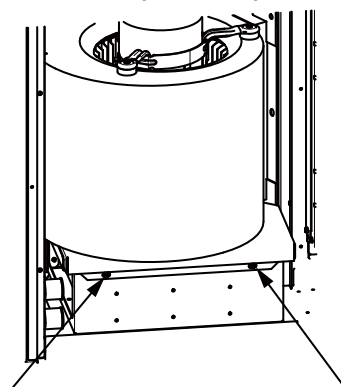
For addressing derating at altitudes above 2000 ft (610 m), the instructions shall indicate one of the following:

1. Installation of this furnace at altitudes above 2000 ft (610 m) shall be in accordance with local codes, or in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or National Standard of Canada, Natural Gas and Propane Installation Code, CSA B149.1.
2. For furnaces requiring modifications other than only gas orifice and/or manifold pressure adjustment for installation at high altitude, "Installation of this furnace at altitudes above 2000 ft (610 m) shall be made in accordance with the Listed High Altitude Conversion Kit available with this furnace."
3. For furnaces requiring only gas orifice and/or manifold pressure adjustment for installation at high altitude, the furnace installation instructions shall provide adequate details on proper adjustments for various altitudes.

## Fuse Parameters

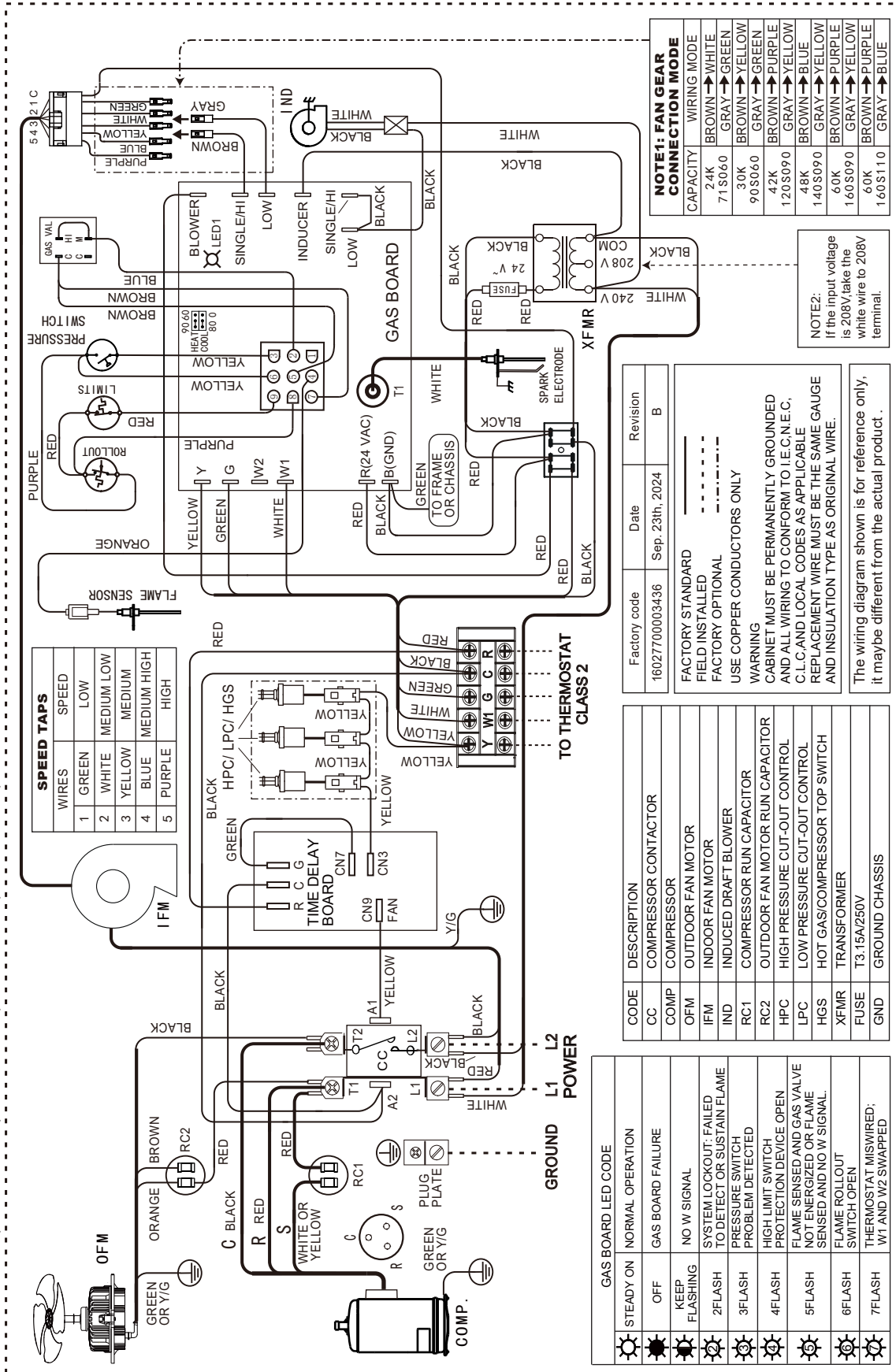
| Model | Type       | RATED VOLTAGE | RATED CURRENT | DIMENSIONS  |
|-------|------------|---------------|---------------|-------------|
| 50T   | /          | 250Vac        | 3.15 A        | 5.2 × 20 mm |
| 522   | Time delay | 250Vac        | 3.15 A        | 5 × 20 mm   |

## Indoor Fan replacement procedure



- Step 1: Power off the unit and check to make sure motor is not operational.
- Step 2: Unplug the power and signal wires from the motor.
- Step 3: Use as crew driver to loosen the 2 bolts.
- Step 4: Ensure that there are no obstacles in the direction of blower housing asm extraction.
- Step 5: Pull out the blower housing asm horizontally.
- Step 6: Ensure that there are no obstacles in the direction of blower housing asm insertion.
- Step 7: New blower housing asm horizontally pushed in.
- Step 8: Use a screwdriver to tightening the 2 bolts.
- Step 9: Plug back the power and signal cables.
- Step 10: Power on the unit and check to make sure the motor is now operational.

MRD-24S060, MRD-30S060, MRD-42S090, MRD-48S090, MRD-60S090, MRD-60S110



MRD-36S090

