

Installer's Guide

Ultra-Low NOx Series Single Packaged Gas Heating/Electric Cooling 13.4 SEER 2 / 81% AFUE, 2 - 5 Ton Units

Models:

4YCL4024B1055A

4YCL4030B1070A

4YCL4036B1070A

4YCL4042B1100A

4YCL4048B1100A

4YCL4060B1100A



Note: "Graphics in this document are for representation only. Actual model may differ in appearance."

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

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

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

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Leave the building immediately.
 - Immediately call your gas supplier from a neighbors phone. Follow the gas suppliers instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

DO NOT DESTROY THIS MANUAL. READ ALL INSTRUCTIONS IN THIS MANUAL AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

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IMPORTANT SAFETY INFORMATION

Please read all instructions before servicing this equipment. Pay attention to all safety warnings and any other special notes highlighted in the manual. Safety markings are used frequently throughout this manual to designate a degree or level of seriousness and should not be ignored. **WARNING** indicates a potentially hazardous situation that if not avoided, could result in personal injury or death. **CAUTION** indicates a potentially hazardous situation that if not avoided, may result in minor or moderate injury or property damage.

WARNING:

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in 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.

WARNING:

These units are fully charged with R-410A refrigerant and ready for installation. When a system is installed according to these instructions, no refrigerant charging is required. If repairs make it necessary for evacuation and charging, it should only be attempted by qualified, trained personnel thoroughly familiar with this equipment. Some local codes require licensed installation service personnel to service this type of equipment. Under no circumstances should the homeowner attempt to install and/or service this equipment. Failure to comply with this warning could result in equipment damage, personal injury, or death.

WARNING:

Do not place combustible material on or against the unit cabinet. Do not place combustible materials, including gasoline and any other flammable vapors and liquids, in the vicinity of the unit.

WARNING:

PROPOSITION 65 WARNING: This product contains fiberglass wool, a product known to the state of California to cause cancer. Disturbing the insulation of this product during installation, maintenance, or repair will expose you to fiberglass wool.

- Breathing this material may cause respiratory irritations or may cause lung cancer.
- Fiberglass wool may also cause eye irritation, skin sensitization, or other allergic responses in susceptible individuals.
- Always wear goggles, disposable gloves, long sleeved shirt, and appropriate breathing protection when working near this insulation. If contact with skin occurs, wash immediately with soap and water. In case of contact with eyes, flush immediately with water for at least 15 minutes. Contact a physician if needed.

WARNING:

The information listed below and on the next page must be followed during the installation, service, and operation of this unit. Unqualified individuals should not attempt to interpret these instructions or install this equipment. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.

- Before beginning the installation, verify that the unit model is correct for the job. The unit model number is printed on the data label. Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.
- Never test for gas leaks with an open flame. Use a commercially available soap solution to check all connections. See [page 12](#).
- Installation of equipment may require brazing operations. Installer must comply with safety codes and wear appropriate safety equipment (safety glasses, work gloves, fire extinguisher, etc.) when performing brazing operations.
- This equipment is **NOT** to be used for temporary heating of buildings or structures under construction.
- Use caution when handling this appliance or removing components. Personal injury can occur from sharp metal edges present in all sheet metal constructed equipment.
- Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.
- The installer should become familiar with the units wiring diagram before making any electrical connections to the unit. See the unit wiring label or [Figure 12 \(page 23\)](#) and [Figure 13 \(page 24\)](#).

REQUIREMENTS & CODES

- **This equipment must be installed in accordance with instructions outlined in this manual, all applicable local building codes, and the current revision of the National Fuel Gas Code (NFPA54/ANSI Z223.1) or the Natural Gas and Propane Installation Code, CAN/CGA B149.1.**
- All electrical wiring must be completed in accordance with local, state and national codes and regulations and with the National Electric Code (ANSI/NFPA 70) or in Canada the Canadian Electric Code Part 1 CSA C.22.1.
- The installer must comply with all local codes and regulations which govern the installation of this type of equipment. Local codes and regulations take precedence over any recommendations contained in these instructions. Consult local building codes and the National Electrical Code (ANSI CI) for special installation requirements.
- This equipment contains liquid and gaseous refrigerant under high pressure. Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment.
- Install this unit only in a location and position as specified on [Figure 1 \(page 5\)](#). This unit is designed only for outdoor installations and should be located with consideration of minimizing the length of the supply and return ducts. Consideration should also be given to the accessibility of fuel, electric power, service access, noise, and shade.
- Air Ducts must be installed in accordance with the standards of the National Fire Protection Association “Standards for Installation of Air Conditioning and Ventilation Systems” (NFPA 90A), “Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems” (NFPA 90B), these instructions, and all applicable local codes.
- Consult [Table 7 \(page 20\)](#), [Table 8 \(page 21\)](#), and the rating plate for the proper circulating air flow and temperature rise. It is important that the duct system be designed to provide the correct flow rates and external pressure rise. An improperly designed duct system can result in nuisance shutdowns, and comfort or noise issues.
- Use only with the type of gas approved for this unit. Refer to the unit rating plate.
- Provide adequate combustion and ventilation air to the unit. See [page 6](#) & [page 7](#).
- Provide adequate clearances around the combustion air intake louvers. See [Figure 1](#).
- Combustion products must be discharged outdoors. Connect this unit to an approved vent system only, as specified on [page 6](#) & [page 7](#).
- The information listed below is for reference purposes only and does not necessarily have jurisdiction over local or state codes. Always consult with local authorities before installing any gas appliance.

Combustion & Ventilation Air

- US: National Fuel Gas Code (NFGC), Air for Combustion and Ventilation
- CANADA: Natural Gas and Propane Installation Codes (NSCNGPIC), Venting Systems and Air Supply for Appliances

Duct Systems

- US and CANADA: Air Conditioning Contractors Association (ACCA) Manual D, Sheet Metal and Air Conditioning Contractors National Association (SMACNA), or American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Fundamentals Handbook

Electrical Connections

- US: National Electrical Code (NEC) ANSI/NFPA 70
- CANADA: Canadian Electrical Code CSA C22.1

Gas Piping & Gas Pipe Pressure Testing

- US: NFGC and National Plumbing Codes
- CANADA: NSCNGPIC

General Installation

- US: Current edition of the NFGC and the NFPA 90B. For copies, contact the National Fire Protection Association Inc., Batterymarch Park, Quincy, MA 02269; or American Gas Association, 400 N. Capitol, N.W., Washington DC 20001 or www.NFPA.org
- CANADA: NSCNGPIC. For a copy, contact Standard Sales, CSA International, 178 Rexdale Boulevard, Etobicoke (Toronto), Ontario, M9W 1R3 Canada

Safety

- US: (NFGC) NFPA 54–1999/ANSI Z223.1 and the Installation Standards, Warm Air Heating and Air Conditioning Systems ANSI/NFPA 90B.
- CANADA: CAN/CGA-B149.1 and .2–M00 National Standard of Canada. (NSCNGPIC)

GENERAL INFORMATION

This single package gas heating / electric cooling unit is designed only for outdoor rooftop or ground level slab installations and can be readily connected to the high static duct system of a home. This unit has been tested for capacity and efficiency in accordance with AHRI standards and will provide many years of safe and dependable comfort, providing it is properly installed and maintained. With regular maintenance, this unit will operate satisfactorily year after year. Abuse, improper use, and/or improper maintenance can shorten the life of the appliance and create unsafe hazards.

To achieve optimum performance and minimize equipment failure, it is recommended that periodic maintenance be performed on this unit. The ability to properly perform maintenance on this equipment requires certain tools and mechanical skills.

Before you install this unit

- ✓ The cooling load of the area to be conditioned must be calculated and a system of the proper capacity selected. It is recommended that the area to be conditioned be completely insulated and vapor sealed.
- ✓ Check the electrical supply and verify the power supply is adequate for unit operation. Consideration should be given to availability of electric power, service access, noise, and shade. If there is any question concerning the power supply, contact the local power company.
- ✓ All units are securely packed at the time of shipment and upon arrival should be carefully inspected for damage prior to installing the equipment at the job site. Claims for damage (apparent or concealed) should be filed immediately with the carrier.
- ✓ Survey the job site to determine the best location for setting the unit. Choose an appropriate location that minimizes the length of the supply and return air ducts.
- ✓ Please consult your dealer for maintenance information and availability of maintenance contracts. Please read all instructions before installing the unit.

Locating the Equipment

- Clearance in accordance with local installation codes, the requirements of the gas supplier and the manufacturer's installation instructions.
- Dégauchement conforme aux codes d'installation locaux, aux exigences du fournisseur de gaz et aux instructions d'installation du fabricant.
- A clearance of at least 36 inches from the blower access panel and from the louvered control access panel is recommended for servicing and maintenance. **Where accessibility to combustibles clearances are greater than minimum clearances, accessibility clearances must take preference.**
- Select a solid, level position, preferably on a concrete slab, slightly above the grade level, and parallel to the home. **DO NOT PLACE UNIT UNDER THE HOME.**

- Overhead obstructions, poorly ventilated areas, and areas subject to accumulation of debris should be avoided. Do not place the unit in a confined space or recessed area where discharge air from the unit to re-circulate into the condenser air inlet, through the coil.
- Sufficient clearance for unobstructed airflow through the louvered control access panel and outdoor coil must be maintained in order to achieve rated performance. See [Figure 1](#) for minimum clearances to obstructions.
- The hot condenser air must be discharged up and away from the home, and if possible, in a direction with the prevailing wind.
- If practical, place the air conditioner and its ducts in an area where they will be shaded from the afternoon sun, when the heat load is greatest.

Heating Load

This unit should be sized to provide the design heating load requirement. Heating load estimates can be made using approved methods available from Air Conditioning Contractors of America (Manual J); American Society of Heating, Refrigerating, and Air Conditioning Engineers; or other approved engineering methods. For installations above 2,000 ft., the unit should have a sea level input rating large enough that it will meet the heating load after deration for altitude.

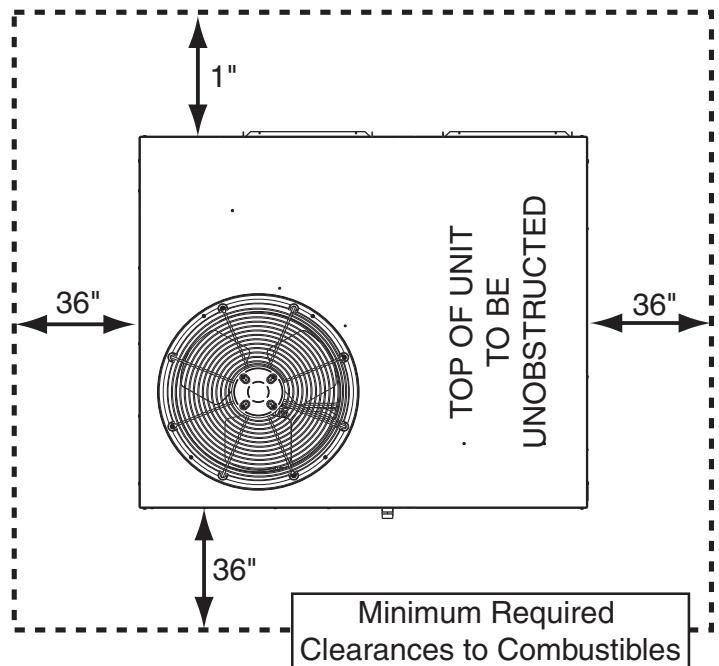


Figure 1. Clearance Requirements

COMBUSTION AIR & VENTING REQUIREMENTS

WARNING:

CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.

The following steps shall be followed with each individual appliance connected to the venting system being placed in operation, while all other appliances connected to the venting system are not in operation:

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

General Information

WARNING:

Installation methods other than those described in the following sections must comply with the National Fuel Gas Code and all applicable local codes for providing sufficient combustion air to the unit.

- Provisions must be made during the installation of this unit that provide an adequate supply of air for combustion.
- Instructions for determining the adequacy of an installation can be found in the current revision of the NFGC (ANSI Z223.1 / NFPA54). **Consult local codes for special requirements.** These requirements are for US installations as found in the NFGC.
- The requirements in Canada (B149.1) are structured differently. Consult with B149.1 and local code officials for Canadian installations.

WARNING:

Combustible air must not be drawn from a contaminated atmosphere. Excessive exposure to contaminated combustion air will result in safety and performance related problems.

- To maximize heat exchanger life, the combustion air must be free of chemicals that can form corrosive acidic compounds in the combustion gases. The recommended source of combustion air is to use clean air from outside. **DO NOT place any chemicals with flammable or caustic vapors or these other corrosive chemicals near the vent termination:**
 - Gasoline/Kerosene
 - Permanent wave solutions
 - Chlorinated waxes and cleaners
 - Chlorine based swimming pool chemicals
 - Water softening chemicals
 - De-icing salts or chemicals
 - Carbon tetrachloride
 - Halogen type refrigerants
 - Cleaning solvents
 - Cements, glues, paint removers, varnishes, etc.
 - Hydrochloric acid
 - Masonry acid washing materials
 - Plumbing Stack

Vent Termination

This unit has been equipped with an integral venting system and designed to operate only with this venting system. No additional venting shall be used. This unit must be vented to the outdoors.

WARNING:

This unit is intended for outdoor installation only. Do not vent the unit through a conventional venting system.

A vent cover assembly has been supplied with the unit. and can be found secured to the gas controls within the control area of this unit. **The vent cover assembly must be installed to assure proper operation of the unit.**

Figure 2 shows the proper installation of the vent cover assembly over the vent outlet on the exterior of the corner panel. The fasteners used to secure the vent cover assembly have been included in the owner's package. The following list summarizes the requirements for the location of the vent system termination:

- The location of the vent termination must be consistent with the National Fuel Gas Code (ANSI Z223.1) or CAN/CGA-B149 Installation Codes.
- The vent termination must be located at least 4 feet horizontally from any electric meters, gas meters, regulators, and relief equipment.
- The vent termination must be located at least 3 feet above any forced air inlet located within 10 feet.
- The vent termination must be located at least 4 feet below, 4 feet horizontally from, or 1 foot above any door, window, or gravity air inlet into any building.
- The vent termination must be located at least 1 foot above grade.
- The unit should be installed in a way that prevents any obstruction of the vent termination during accumulating snow.
- The unit installation shall avoid areas where condensate drainage may cause problems by dropping on planters or patios, etc. Also verify exhaust gases will not impinge on windows or building surfaces, which may be compromised or damaged by condensation.
- Do not install the unit such that exhaust from the vent termination is directed into window wells, stairwells, under decks, or in alcoves or similarly recessed areas. The vent termination must not be located above any public walkways.

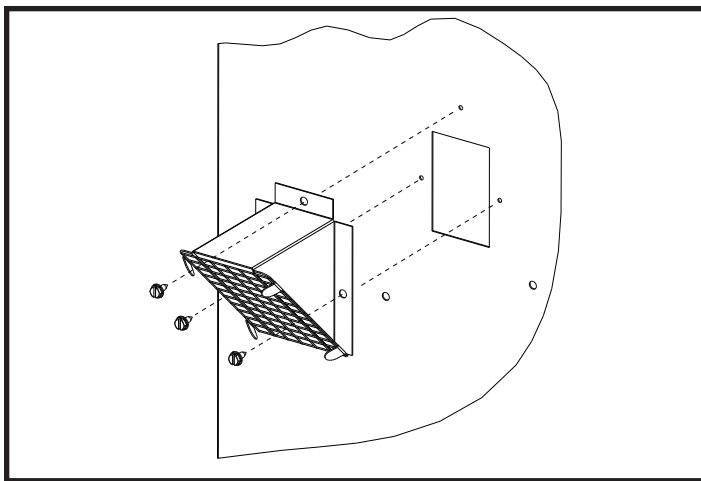


Figure 2. Vent Assembly

CIRCULATING AIR SUPPLY

WARNING:

Products of combustion must not be allowed to enter the return air ductwork or the circulating air supply. 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.

All return ductwork must be adequately sealed, all joints must be taped, and the ductwork must be secured to the unit with sheet metal screws. When return air is provided through the bottom of the unit, the joint between the unit and the return air plenum must be air tight.

The roof curb or cement pad on which the unit is mounted must provide sound physical support of the unit with no gaps, cracks, or sagging between the unit and the curb or pad.

Return air and circulating air ductwork must not be connected to any other heat producing device such as a fireplace insert, stove, etc. Doing so may result in fire, explosion, carbon monoxide poisoning, personal injury, or property damage.

Air Ducts

This unit is designed only for use with a supply and return duct. Air ducts should be installed in accordance with the standards of the National Fire Protection Association "Standard for Installation of Air Conditioning Systems" (NFPA 90A), "Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems" (NFPA 90B), and all applicable local codes. NFPA publications are available by writing to: National Fire Protection Association, Batterymarch Park, Quincy, ME 02269 or visit www.NFPA.org on the web.

- Design the duct work according to Manual D by the Air Conditioning Contractors of America (ACCA).
- The ducts must be properly sized not to exceed 0.30 inches WC pressure drop per 100 feet of equivalent duct at 400 SCFM per nominal ton of cooling capacity.
- Duct work should be attached directly to the unit flanges for horizontal applications.
- If roof curb is installed, the ducts must be attached to the curb duct supports, not the unit.
- It is recommended that the outlet duct be provided with a removable access panel. The opening should be accessible when the unit is installed in service and shall be sized so that smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heat exchanger. The cover for the opening shall be attached in a way that will prevent leaks.
- If outside air is utilized as return air to the unit for ventilation or to improve indoor air quality, the system must be designed so that the return air to the unit is not less than 50° F (10° C) during heating operation.

Air Filter Requirements

An air filter is not supplied with this package unit as shipped from the factory. The installer must provide a high velocity filter that is appropriately sized to the return air duct opening or internal filter rack. The filters must comply with ANSI/UL 900 or CAN/ULC-S111.

WARNING:

Never operate the unit without a filter in place. Dust and lint could accumulate on internal parts, resulting in loss of efficiency, equipment damage and possible fire.

NOTE TO INSTALLER: After installing or replacing the filtration system for this unit, add the following statement on or adjacent to the filter service panel: **“Replace filter(s) installed in your system only with the same dimensional size filters that are being replaced.”**

- A suitable air filter must be installed upstream of the evaporator coil of the return air system. Refer to [Table 1](#) for recommended external filter sizes.
- All return air must pass through the filters before entering the evaporator coil. It is important that all filters be kept clean and replaced frequently to ensure proper operation of unit. Dirty or clogged filters will reduce the efficiency of the unit and result in unit shutdowns.
- Air filter pressure drop must not exceed 0.08 inches WC.

Unconditioned Spaces

All duct work passing through unconditioned space must be properly insulated to minimize duct losses and prevent condensation. Use insulation with an outer vapor barrier. Refer to local codes for insulation material requirements.

Acoustical Duct Work

Certain installations may require the use of acoustical lining inside the supply duct work.

- Acoustical insulation must be in accordance with the current revision of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) application standard for duct liners.
- Duct lining must be UL classified batts or blankets with a fire hazard classification of FHC-25/50 or less.
- Fiber duct work may be used in place of internal duct liners if the fiber duct work is in accordance with the current revision of the SMACNA construction standard on fibrous glass ducts. Fibrous duct work and internal acoustical lining must be NFPA Class 1 air ducts when tested per UL Standard 181 for Class 1 ducts.

EXTERNAL FILTER SIZES			
NOMINAL COOLING (TONNAGE)	FILTER SIZE (IN. X IN.)	APPROXIMATE AIR FLOW RANGE (CFM)	APPROXIMATE FILTER AREA (SQ. IN.)*
2.0	20 x 25	600-900	450
2.5	20 x 30	750-1200	550
3.0	25 x 25	1100-1300	625
3.5	24 x 30	1200-1600	750
4.0	18 x 24 (2 required)	1400-1800	850
5.0	20 x 25 (2 required)	1700-2200	1000

INTERNAL FILTER SIZES				
CABINET HEIGHT	OUTDOOR FAN DIAMETER	FILTER SIZE (IN. X IN.)	APPROXIMATE AIR FLOW RANGE (CFM)	APPROXIMATE FILTER AREA (SQ. IN.)*
30"	20	(2) 14"x25"	700 - 1300	700
	24"	(1) 12"x20" and (1) 16"x25"		640
34"	20	(2) 16"x25"	900 - 1400	800
	24"	(1) 12"x20" and (2) 10"x25"		740
38"	20"	(2) 18"x25"	1100 - 1600	900
	24"	(1) 12"x20" and (2) 12"x25"		840
42"	20"	(2) 20"x25"	1300 - 1800	1000
	24"	(1) 12"x20" and (2) 14"x25"		940

* Based on velocity of 300 ft/min for disposable filters.

Table 1. Recommended External Air Filter Sizes

UNIT INSTALLATION

Packaging Removal

Remove the shipping carton and User's Manual from the equipment. For rooftop installations, remove and discard the two supports attached beneath the unit.

Rigging & Hoisting

WARNING:

To avoid the risk of property damage, personal injury, or death, it is the rigger's responsibility to ensure that whatever means are used to hoist the unit are safe and adequate:

- **The lifting equipment must be adequate for the load. Refer to Table 5 (page 18) for unit weights.**
- **The unit must be lifted from the holes in the base rails using cables or chains.**
- **Spreader bars are required to protect the unit and ensure even loading.**
- **Keep the unit in an upright position at all times. The rigging must be located outside the units center of gravity. Refer to Figure 10 (page 18) for locating the center of gravity.**
- **All panels must be securely in place during rigging and hoisting.**

Clearances to Combustible Materials

These units are certified as combination heating and cooling equipment for outdoor rooftop or ground level installations. Units may be installed on combustible flooring or Class A, B, or C roofing material when used with bottom supply and return air ducts as long as the following requirements are met:

- If using bottom discharge with return air ducts a roof curb must be installed prior to unit installation. See Rigging and Hoisting section for setting of the unit.
- Sufficient clearance for unobstructed airflow through the outdoor coil must also be maintained in order to achieve rated performance. See page 5 for information about locating the equipment.

Rooftop

Rooftop installations must be located according to local building codes or ordinances and these requirements:

- The roof must be capable of handling the weight of the unit. For unit weights, see Table 5. Reinforce the roof if necessary.
- The appropriate accessory roof curb must be installed prior to unit installation. The roof curb must be square and level to ensure proper condensate drainage. **Please follow all instructions provided with the kit.** See Figure 3 (page 10).
- Secure roof curb or frame to roof using acceptable mechanical methods per local codes. **NOTE:** Make sure the two supports beneath the unit have been removed.

Ground Level

Ground level installations must be located according to local building codes or ordinances and these requirements:

- Clearances must be in accordance with those shown in Figure 1 (page 5).
- A suitable mounting pad must be provided and be separate from the building foundation. The pad must be level to ensure proper condensate disposal and strong enough to support

the unit's weight. The slab height must be a minimum of 2" (5cm) above grade and with adequate drainage. See Figure 4 (page 10).

- Remove and discard the horizontal Supply and Return duct covers located on the rear of the unit. Form duct attachment flanges by bending the sheet metal outward 90 degrees along the perforated lines.
- Firmly attach ductwork directly to these flanges with screws or other approved mechanical connections and not to the Supply/Return air panels to avoid damage to internal components of the equipment. Once completed use approved duct sealing methods to ensure an air and watertight seal is achieved.

Horizontal to Downflow Conversion

The unit is shipped ready for horizontal duct connections. If down flow ducts are required, the unit must be converted following the steps below for both the supply and return ducts.

1. Remove the horizontal duct cap.
2. Locate the duct cap inside the duct openings and remove the screw holding it in place.
3. Lift the cap out of the unit. (**Hint:** The cap can be pushed up from the bottom by reaching through the fork slot).
4. Cover the horizontal duct opening with the horizontal duct cap. The insulation will be on the indoor side.
5. Fasten the cover with screws to seal.
6. Remove and discard the two wood supports beneath the unit.

Condensate Drain

Condensate is removed from the unit through the 3/4" female pipe fitting located on the front side of the unit. See Figure 5 (page 10).

Install a 2 inch condensate trap in the drain line of the same size and prime with water. When connecting rigid drain line, hold the female fitting with a wrench to prevent twisting. **Do not over tighten!** Refer to local codes and restrictions for proper condensate disposal requirements.

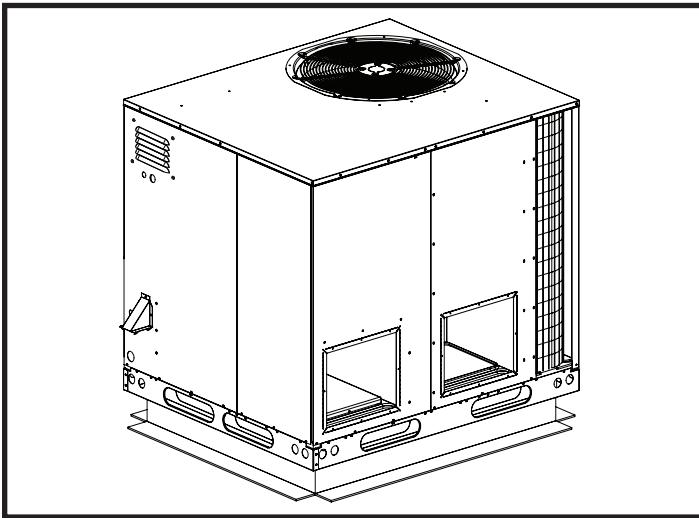


Figure 3. Roof Top Installation

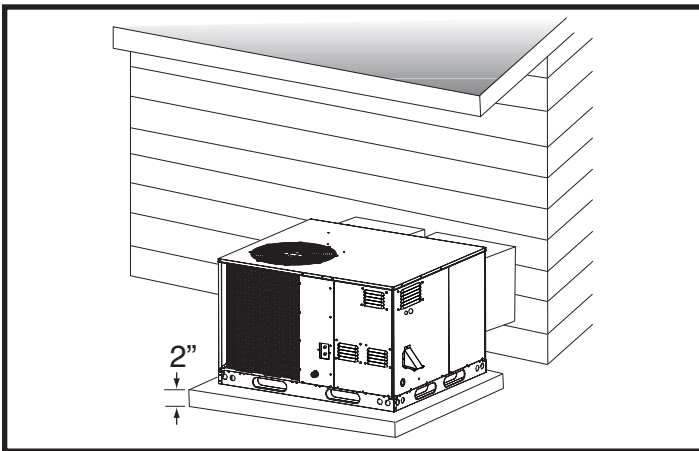


Figure 4. Ground Level Installation

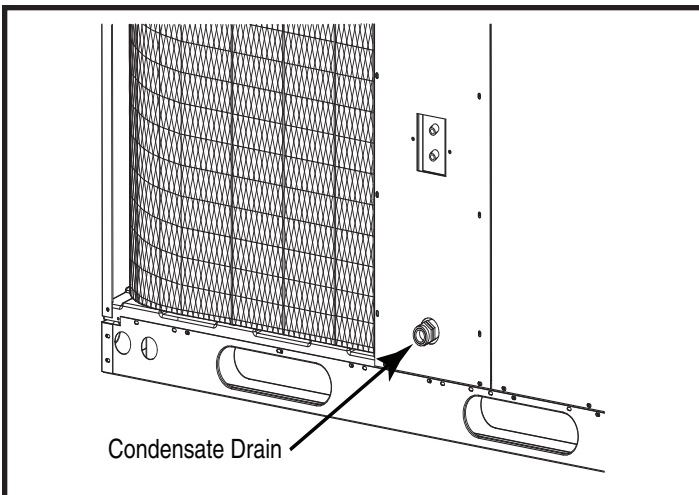


Figure 5. Refrigerant Service Ports & Condensate Drain Locations

ELECTRICAL WIRING

WARNING:

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in 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.**

- Electrical connections must be in compliance with all applicable local codes and ordinances, and with the current revision of the National Electric Code (ANSI/NFPA 70).
- For Canadian installations the electrical connections and grounding shall comply with the current Canadian Electrical Code (CSA C22.1 and/or local codes).

IMPORTANT NOTE:

If replacing any of the original wires supplied with the furnace, the replacement wire must be copper wiring having the same gauge, voltage, and temperature rating.

Pre-Electrical Checklist

- ✓ Verify the voltage, frequency, and phase of the supply source match the specifications on the unit rating plate.
- ✓ Verify that the service provided by the utility is sufficient to handle the additional load imposed by this equipment. See [Table 2 \(page 11\)](#) and [Table 10 \(page 25\)](#) (or the unit rating label) for proper high voltage wiring requirements.
- ✓ Verify factory wiring is in accordance with the unit wiring diagram. See [Figure 12 \(page 23\)](#) and [Figure 13 \(page 24\)](#). Make sure the connections didn't loosen during shipping or installation.

Grounding

WARNING:

The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. Do not use gas piping as an electrical ground!

This 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) or the CSA C22.1 Electrical Code. Grounding of the unit is accomplished by using the grounding lug provided in the control box.

Line Voltage

- The line voltage to the unit should be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the unit.

- **An electrical disconnect must be located within sight of and readily accessible to the unit.** This switch shall be capable of electrically de-energizing the outdoor unit. See unit data label for proper incoming field wiring. Any other wiring methods must be acceptable to authority having jurisdiction.
- Use only copper wire for the line voltage power supply to this unit as shown in [Table 2](#). Use proper code agency listed conduit and a conduit connector for connecting the supply wires to the unit. Use of rain tight conduit is recommended.
- Provide power supply for the unit in accordance with the unit wiring diagram and the unit rating plate.
- Overcurrent protection must be provided at the branch circuit distribution panel and sized as shown on the unit rating label and according to applicable local codes. See [Table 10](#) (or the unit rating plate) for minimum circuit ampacity and maximum overcurrent protection limits.
- A wiring diagram is located on the inside cover of the control access panel of the outdoor unit. The installer should become familiar with the wiring diagram before making any electrical connections to the outdoor unit. See [Figure 12](#) and [Figure 13](#).
- Units are shipped from the factory wired for 230 volt transformer operation.
- Connect the line-voltage leads to the terminals on the contactor inside the control compartment.

Thermostat / Low Voltage Connections

- This unit is designed to operate from a 24 VAC Class II control circuit. A single stage cooling / single stage heating thermostat should be used with this unit. See [Figure 6](#) (page 11) for typical thermostat connection.
- The control circuit wiring must comply with the current provisions of the NEC (ANSI/NFPA 70) and with applicable local codes having jurisdiction. Thermostat connections should be made in accordance with the instructions supplied with the thermostat and the indoor equipment.
- The low voltage wires must be properly connected. Route 24V control wires through the sealing grommet near the power entrance.
- Several thermostat options are available depending on the accessories installed with the unit. Select a thermostat that operates in conjunction with the installed accessories.
- The thermostat should be mounted about 5 feet above the floor on an inside wall. DO NOT install the thermostat on an outside wall or any other location where its operation may be adversely affected by radiant heat from fireplaces,

sunlight, or lighting fixtures, and convective heat from warm air registers or electrical appliances. Refer to the thermostat manufacturer's instruction sheet for detailed mounting information.

Checking Heat Anticipator Settings

- Add the current draw of the system heating components.
OR
- Measure the current flow on the thermostat **R-W** circuit after the circulating blower motor has started. Set the heat anticipator according to the thermostat manufacturer's instructions for heat anticipator settings.

Blower Speed

The blower speed is preset at the factory for fan only, heating, and cooling operation. These factory settings are listed in [Table 6](#) (page 19) and [Table 7](#) (page 20). For optimum system performance and comfort, it may be necessary to change the factory set speed.

! CAUTION:

To avoid personal injury or property damage, make sure the motor leads do not come into contact with any uninsulated metal components of the unit.

5-Speed ECM Motor

- Shut off all electrical power to the unit and remove the control panel. **NOTE:** The furnace board has slide switches to select between blower speeds that are preset from the factory. The heat, cool, and fan speed can be changes by sliding the switch from the available options of L-Low, ML-Medium Low, MH-Medium High, H-High. The blower motor speeds increase as the switch is moved from Low to High.
- A movable jumper beside the blower speed slide switches change fan speed(G call). The fan speed is preset from the factory for the Lowest blower speed L. Changing this position of the jumper one setting at a time will increase the fan speed.

Optional Furnace Control Board Connections

Electronic Air Cleaner

The furnace control board provides output terminals for an optional electronic air cleaner (EAC) that can be installed in the return air duct of your system. THE EAC output is energized any time the HEAT or COOL blower speed is energized. Control ratings are 1.0 Amp. @ 240 VAC. Output connections are made via board terminals labeled EAC and NEUTRAL.

COPPER WIRE SIZE — AWG (1% VOLTAGE DROP)				
SUPPLY WIRE LENGTH-Feet				SUPPLY CIRCUIT AMPACITY
200	150	100	50	
6	8	10	14	15
4	6	8	12	20
4	6	8	10	25
4	4	6	10	30
3	4	6	8	35
3	4	6	8	40
2	3	4	6	45
2	3	4	6	50
2	3	4	6	55
1	2	3	4	60

NOTE: Wire Size based on N.E.C. for 60° type copper conductors.

Table 2. Copper Wire Size

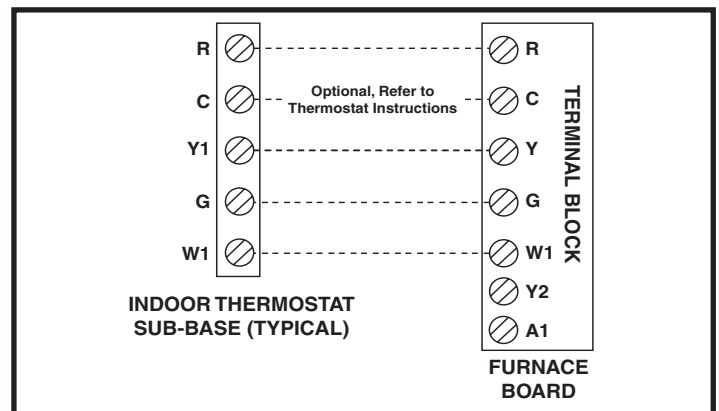


Figure 6. Typical Thermostat Connection (Field Supplied) for 1-Stage Cool / 1-Stage Heat

Humidifier

The furnace control board provides output terminals for an optional humidifier (HUM) that can be installed on your system. The HUM output is energized any time the furnace inducer motor is energized. Control ratings are 1.0 Amp. @ 240 VAC. Output connections are made via board terminals labeled HUM and NEUTRAL.

Check all factory wiring to the units wiring diagram. Inspect the factory wiring connections to be sure none loosened during shipping or installation.

GAS SUPPLY & PIPING

WARNING:

FIRE OR EXPLOSION HAZARD

- Failure to follow safety warnings exactly could result in serious injury, death, or property damage.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

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

- All gas piping must be installed in compliance with local codes and utility regulations. In the absence of local codes the gas line installation must comply with the latest edition of the National Fuel Gas Code ANSI Z223.1 or CAN/CGA B149 Installation Codes.
- Some local codes require the installation of a manual main shut-off valve and ground joint union external to the unit. The shut-off valve should be readily accessible for service and/or emergency use. Consult the local utility or gas supplier for additional requirements regarding placement of the manual main gas shut-off. See [Figure 7 \(page 13\)](#).
- The manifold pressure must be set to the appropriate value for your installation. Refer to the Manifold Pressure Adjustment section ([page 14](#)) for adjustment instructions.
- Gas piping must never run in or through air ducts, chimneys, gas vents, or elevator shafts.
- The main gas shutoff valve and main power disconnect to the unit must be properly labeled by the installer in case emergency shutdown is required.
- An 1/8 inch NPT plugged tap must be installed in the gas line immediately upstream of the gas supply connection to the unit for use when measuring the gas supply pressure. The plug should be readily accessible for service use.
- A drip leg should be installed in the vertical pipe run to the unit. See [Figure 7](#).

This unit only has right side gas entry. When connecting the gas, provide clearance between the gas supply line and the entry hole in the unit's casing to avoid unwanted noise and/or damage to the unit. A typical gas service hookup is shown in [Figure 7](#).

[Table 8 \(page 21\)](#) lists gas pipe capacities for standard pipe sizes as a function of length in typical applications based on nominal pressure drop in the line.

Leak Check

WARNING:

FIRE OR EXPLOSION HAZARD

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

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

After the gas piping to the unit is complete, all connections must be tested for gas leaks. This includes pipe connections at the main gas valve, emergency shutoff valve and other gas connectors. A soap and water solution can be applied on each joint or union using a small paintbrush. If any bubbling is observed, the connection is not sealed adequately and must be retightened. Repeat the tightening and soap check process until bubbling ceases.

- If pressure testing the gas supply lines at pressures greater than 1/2 psig (14 inches WC), the unit must be disconnected from the gas supply piping system to prevent damage to the gas valve.
- If the test pressure is less than or equal to 1/2 psig (14 inches WC), the unit must be isolated from the gas supply line by closing the manual shut-off valve.

High Altitude Conversion - Natural Gas

For installations between zero and 5000 ft above sea level, the factory installed gas orifice should be used. High altitude conversion with this furnace depends on the installation altitude and the heating value of the gas. Installation of this furnace at altitudes above 2,000 feet shall be in accordance with local codes, or in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54. Please consult your local code authority.

WARNING:

The reduction of input rating necessary for high altitude installation may only be accomplished with factory supplied orifices. Do not attempt to drill out orifices in the field. Improperly drilled orifices may cause fire, explosion, carbon monoxide poisoning, personal injury or death.

The furnaces are shipped from the factory with orifices and gas regulator settings for natural gas operation up to 5000 ft. At 2,000 feet, the NFGC requires that this appliance be derated 4% for each 1,000 feet of altitude. For example, at 2,000 feet the input needs to be reduced 8%, at 3,000 feet (12%), etc. This deration is in reference to the input rate and gas heating value at sea level.

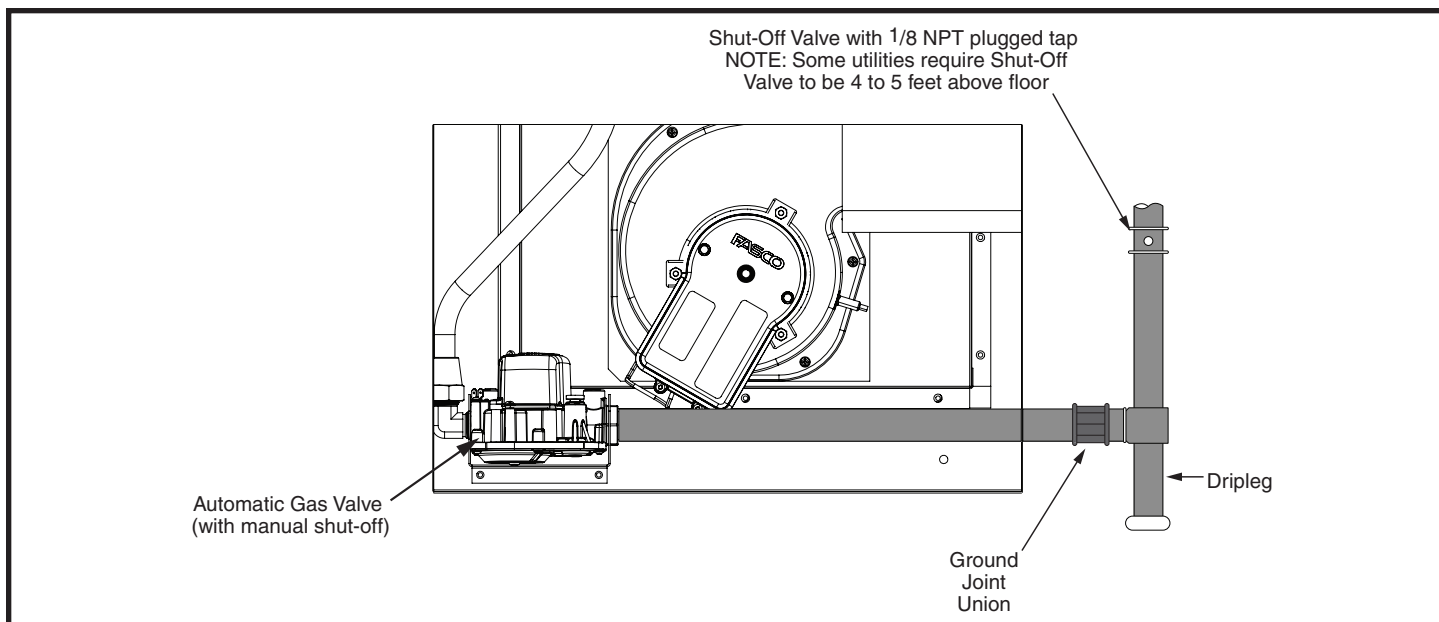


Figure 7. Typical Gas Hookup - Right Side Entry

To derate the furnace requires knowing the heating value of the gas at the installation site. Heating values at particular job sites vary for two reasons:

1. The chemical mixture of the gas varies across regions and is expressed as the "sea level heating value".
2. The heating value varies by altitude. For this reason, especially in high altitude areas, the local gas utility specifies the heating value at the residence's gas meter as the "local value".

⚠ WARNING:

This unit was equipped at the factory for use with natural gas only. LP/Propane cannot be used with this unit. Failure to follow safety warnings exactly could result in serious injury, death or property damage.

START UP & ADJUSTMENTS

Pre-Start Check List

- ✓ Verify the unit is level and allows condensate to drain.
- ✓ Verify all clearance requirements are met and there is free airflow to and from the outdoor coil.
- ✓ Verify that the duct work is sealed to prevent air leakage and air filter is installed.
- ✓ Verify that the line voltage power leads are securely connected and the unit is properly grounded.
- ✓ Verify that the low voltage wires are securely connected to the correct terminals in the low voltage area of the control box.
- ✓ Verify that the gas line service pressure does not exceed 10.0 inches WC (0.36 psig), and is not less than 4.5 inches WC (0.16 psig) for natural gas.
- ✓ Verify that the burner limit control is closed. If necessary, press the red button to reset the control. **DO NOT** install a jumper wire across the control to defeat its function. If the control reopens upon start-up, **DO NOT** reset the control without identifying and correcting the fault condition which caused the control to trip.

- ✓ Verify that the gas line has been purged and all connections are leak tight.
- ✓ Verify that all exterior panels are replaced and securely fastened.
- ✓ Verify that the outdoor fan turns freely.
- ✓ Verify that the power supply branch circuit overcurrent protection is sized properly.
- ✓ Verify that the thermostat is wired correctly. The thermostat function switch should be set to OFF and the thermostat fan switch should be set to AUTO.

Start-Up Procedure

⚠ WARNING:

If this unit is equipped with crankcase heaters, allow 24 hrs for heating of the refrigerant compressor crankcase prior to start up or anytime the power has been removed for more than 12 hrs. Failure to comply may result in damage or cause premature failure of the system.

Air Circulation

Leave the thermostat system mode on OFF, and set the fan mode to ON. Blower should run continuously. Check the air delivery at the supply registers and adjust register openings for balanced air distribution. Examine ductwork for leaks or obstruction if insufficient air is detected. Set the thermostat fan mode to AUTO. The blower should stop running.

System Cooling

1. Set the thermostat's system mode to COOL and the fan mode to AUTO. Gradually lower the thermostat temperature setpoint below room temperature and verify the compressor, fan and indoor blower energize.
 2. Feel the air being circulated by the indoor blower and verify that it is cooler than ambient temperature. Listen for any unusual noises. If unusual sounds occur, determine the source of the noise and correct as necessary.
 3. Allow the cooling system to operate for several minutes and then set the temperature selector above room temperature. Verify the fan and compressor cycle off with the thermostat.
- NOTE:** The blower will also stop after a 60 second delay.

System Heating

1. Set the thermostat to the lowest setting.
2. Follow the procedures given on the operating instruction label, this manual or attached inside the louvered control access panel.
3. Set the thermostat above room temperature and verify the Operating Sequence. See [page 16](#).
4. Verify that the compressor and outdoor fan motor are not energized.
5. After the unit has run for approximately five minutes, set the thermostat below room temperature and verify the shutdown sequence; steps 10, 11, & 12 in the Operating Sequence section on [page 16](#).

Verifying & Adjusting Temperature Rise

Verify the temperature rise through the unit is within the range specified on the unit data label. Temperature rises outside the specified range could result in premature heat exchanger failure.

1. Place thermometers in the return and supply air stream as close to the unit as possible. The thermometer on the supply air side must be shielded against direct radiation from the heat exchanger to avoid false readings.
2. Adjust all registers and duct dampers to the desired position. Run the unit for 10 to 15 minutes before taking any temperature readings. The temperature rise is the difference between the supply and return air temperatures.

NOTE: For typical duct systems, the temperature rise will fall within the range specified on the data label (with the blower speed at the factory recommended setting) shown in [Table 6 \(page 19\)](#) or [Table 7 \(page 20\)](#). If the measured temperature rise falls outside the specified range, it may be necessary to change the blower speed. Lowering the blower speed increases the temperature rise and a higher speed decreases the temperature rise.

Verifying & Adjusting Firing Rate

⚠ CAUTION:

Do not re-drill the burner orifices. If the orifice size must be changed, use only new orifices.

The firing rate must be verified for each installation to prevent over-firing of the unit. **The firing rate must not exceed the rate shown on the unit data label.** To determine the firing rate, follow the steps below:

1. Obtain the gas heating value (HHV) from the gas supplier.
2. Shut off all other gas fired appliances.
3. Start the unit in heating mode and allow it to run for at least 3 minutes.
4. Measure the time (in seconds) required for the gas meter to complete one revolution.
5. Convert the time per revolution to cubic feet of gas per hour using [Table 9 \(page 21\)](#).
6. Multiply the gas flow rate in cubic feet per hour by the heating value of the gas in Btu per cubic foot to obtain the firing rate in Btu per hour. See Example.

Example:

- Time for 1 revolution of a gas meter with a 1 cubic foot dial = 40 seconds.
- From [Table 9](#), read 90 cubic feet gas per hour.
- Local heating value of the gas (obtained from gas supplier) = 1,040 Btu per cubic foot.
- Input rate = 1,040 x 90 = 93,600 Btuh.

7. Adjust the manifold pressure if necessary. See Manifold Pressure Adjustment below. For additional information about elevations above 2,000 feet, see [page 12](#).

Manifold Pressure Adjustment

The manifold pressure must be set to the appropriate value for your installation. To adjust the manifold pressure:

1. Obtain the required manifold pressure setting
NOTE: The values listed in the tables are based on sea level values. At higher altitudes, the heating value of gas is lower than the sea level heating value.
2. Remove the regulator capscrew ([Figure 8](#)) from the INLET side of the regulator.
3. Slowly turn the adjustment screw inside the regulator to obtain the appropriate manifold pressure.
NOTE: Turning the screw clockwise increases the pressure and turning the screw counter-clockwise decreases the pressure. To prevent backing the screw all the way out from the valve, turn the screw slowly.
4. Replace and tighten the regulator capscrew over the adjustment screw.

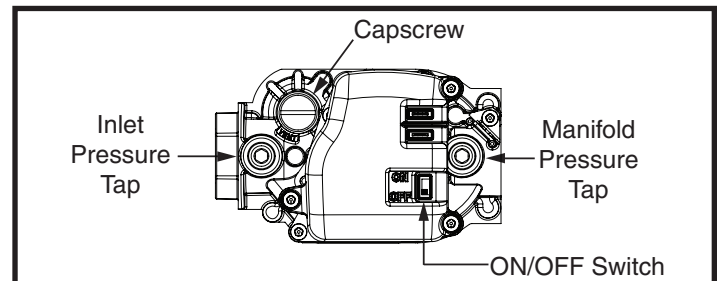


Figure 8. Regulator Capscrew & Tap Locations

Verifying Over-Temperature Limit Control Operation

1. Verify the louvered control access panel is in place and that there is power to the unit.
2. Block the return airflow to the unit by installing a close-off plate in place of or upstream of the filter.
3. Set the thermostat above room temperature and verify the units operating sequence on [page 16](#).

NOTE: The over-temperature limit control should turn off the gas valve within approximately four minutes (exact time depends on the efficiency of the close-off when blocking the return air). The circulating air and combustion blowers should continue to run when the over-temperature limit control switch opens.

4. Remove the close-off plate immediately after the over-temperature limit control opens. If the unit operates for more than four minutes with no return air, set the thermostat below room temperature, shut off power to the unit, and replace the over-temperature limit control.

Verifying Burner Operation

⚠ CAUTION:

The door over the burners may only be open for inspection purposes only. The door must be installed during unattended operation.

1. Remove the burner compartment door and note the location of the sightglass on burner head.
2. Set the thermostat above room temperature and observe the ignition sequence. **NOTE:** The burner flame should be present by seeing a glow through the sightglass.

3. After validating the flame, change the thermostat setting to below room temperature.
4. Verify the burner flame is completely extinguished.
5. Replace the burner compartment door.

Verify Operation of the Supply Air Limit Switch

A properly functioning limit switch should turn off the gas valve when the return is blocked (time depends on how well the return air is blocked). The circulating air and combustion blowers should continue to run when the limit switch opens.

1. Verify the blower door is securely mounted in place and that there is power to the furnace.
2. Block the return airflow to the furnace by installing a close-off plate in place of or upstream of the filter(s).
3. Set the thermostat above room temperature and observe the Operating Sequence.
4. Remove the close-off immediately after the limit switch opens. If the furnace continues to operate with no return air, set the thermostat below room temperature, shut off power to the furnace, and replace the limit switch.

ALTITUDE ABOVE SEA LEVEL	HEATING VALUE BTU/CU. FT			ORIFICE
	800 TO 899	900 TO 999	1,000 TO 1,100	
ZERO TO 5,000 FT.	3.5	3.5	3.5	FACTORY INSTALLED

Table 3. Manifold Pressure Setting (In WC) for Natural Gas

OPERATING SEQUENCE

The operating sequences for the heating, cooling, and fan modes are described below. Refer to the field and unit wiring diagram. See [Figure 12 \(page 23\)](#) and [Figure 13 \(page 24\)](#).

Heating Cycle

1. The thermostat calls for heat by energizing the **W** terminal with 24VAC.
2. The control verifies the safety circuit pressure switch is open and high temperature limit switch circuit is closed.
3. If the pressure switch is open, the control energizes the inducer and waits for the pressure switch to close. The pressure switch must close within 10 seconds.
4. The control runs the inducer for a 30 second pre-purge.
5. The control energizes the igniter output for a 30 second warm-up period.
6. The control energizes the main gas valve for 3 seconds.
7. If the flame is proved after igniting the gas, the control de-energizes the igniter. The gas valve and inducer remain energized. The control goes to blower on delay.
8. If flame is present, the control energizes the blower on the selected HEAT speed 30 seconds after the gas valve opened. The gas valve remains energized while the inducer ramps to Max. RPM over a programmed time period.
9. When the thermostat demand for heat is satisfied, the control de-energizes the gas valve. The inducer output remains on for a 90 second post-purge period.
10. Blower off timing of 60, 90, 120, & 180 seconds (depending on the movable jumper setting) begins when the thermostat is satisfied. See [Figure 14 \(page 16\)](#). The control will operate at the selected HEAT speed of 60 seconds, then change to FAN speed for the remaining off delay time. If the blower off delay jumper is not present, the fan should still operate for 120 seconds at the selected HEAT speed. The indoor blower motor is de-energized after a blower off delay as selected by the movable jumper.

Cooling Cycle

1. The thermostat calls for cooling by energizing the **Y & G** terminal with 24VAC.
2. The control energizes the blower in the cooling speed and sends 24VAC to the contactor in the condensing section.
3. When the thermostat removes the call for cooling, the contactor in the outdoor condensing section is de-energized and the control continues to run the fan for a period of 60 seconds.

Fan Mode

- When the thermostat energizes the **G** terminal for continuous fan (without calling for heat or cooling), the indoor fan is energized on the selected FAN speed. See [Figure 6 \(Page 11\)](#). The control defaults to MEDIUM HIGH if the movable jumper is not attached.
- If a call for cooling occurs during continuous fan, the blower will switch over to the selected COOL speed.
- If the **W** terminal receives a call for heat during continuous fan, the blower will de-energize and reset to delayed ON timing.
- A call for fan is ignored while in lockout.

EQUIPMENT MAINTENANCE

WARNING:

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in 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.**

CAUTION:

Use care when removing parts from this unit. Personal injury can result from sharp metal edges present in all equipment of sheet metal construction.

Proper maintenance is important to achieve optimum performance from the system. The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these skills, contact your dealer for maintenance. Consult your local dealer about the availability of maintenance contracts. Routine maintenance should include the following:

CAUTION:

The unit should never be operated without a filter in the return air system. Replace disposable filters with the same type and size.

- Inspect, clean or replace air filters at the beginning of each heating and cooling season, or more frequently if required. Refer to [Table 1 \(page 8\)](#) for recommended external filter sizes
- Inspect the condensate drain and outdoor coil at the beginning of each cooling season. Remove any debris. Clean the outdoor coil and louvers as necessary using a mild detergent and water. Rinse thoroughly with water.
- Inspect the electrical connections for tightness at the beginning of each heating and cooling season.
- The blower compartment should be cleaned monthly during the heating and cooling seasons to remove any dirt and lint that may have accumulated in the compartment or on the blower and motor. Buildup of dirt and lint on the blower and motor can create excessive loads on the motor resulting in higher than normal operating temperatures and possible shortened service life.
- Maintain heat exchanger and burners. The unit should operate for many years without excessive scale buildup in the heat exchanger, however, the heat exchanger, the vent system, and the burners should be inspected and cleaned (if required) by a qualified Technician annually to ensure continued safe operation. Particular attention must be given to identify deterioration from corrosion or other sources.
- The motors for the circulating air blower, outdoor fan, and combustion blower are pre-lubricated at the factory. No further oiling is required for the life of this product.
- Inspect and clean the screen of the vent cover assembly at the beginning of each heating and cooling season.

Heat Exchanger & Burner Maintenance - The furnace should operate for many years without soot buildup in the flue passageways, however, the flue and vent system should be inspected and cleaned (if required) by a qualified service technician annually to ensure continued safe operation. Pay attention to any deterioration from corrosion or other sources.

Lubrication - The bearings in the blower motor and inducer blower used in these furnaces are pre-lubricated and sealed by the manufacturer. No further oiling of the bearings is required for the life of the motor.

Cleaning of Flame Sensor - If the flame sensor is suspect for Loss of Flame fault code, the sensor can be cleaned to see if that remedies the issue. Follow steps 1 - 10. See [Figure 14 \(page 26\)](#) for component location.

⚠ CAUTION:

Due to igniter/flame sensor assembly location, a new gasket should be on hand before servicing this part. One new gasket is provided in the furnace extra parts package. Failure to re-seal the assembly after service can result in abnormal furnace operation.

1. Shut off gas supply to the furnace at the meter or at a manual valve in the supply piping.
2. Turn off all power to the furnace and set the thermostat to its lowest setting.
3. Remove the louvered door from the unit.
4. Turn the gas control switch to the OFF position.
5. Remove the 2 screws securing the combustion air orifice plate to the air/fuel mixing tube (if needed to access the igniter/flame sensor assembly cover on smaller models).
6. Remove 8 screws from perimeter of access cover plate.

7. Lift the assembly and bracket straight up out of the burner box and off the HX panel. **NOTE:** Use of a flat blade screwdriver between assembly bracket and top of burner mounting bracket to help leverage bracket off may be required. See [Figure 9](#).
8. Clean the flame sensor using steel wool being careful not to damage the igniter.
9. Replace old gasket with new gasket ensuring correct orientation, with adhesive side to the bracket.
10. Replace igniter/flame sense assembly in reverse order they were removed.

Vent System - Check the vent pipe and/or chimney for corrosion or debris. Any corroded section of vent pipe must be replaced, and any obstruction or blockage must be removed prior to operating the furnace.

⚠ WARNING:

Holes in the vent pipe or heat exchanger can cause combustion products to enter the home. Replace the vent pipe or heat exchanger if leaks are found. Failure to prevent the circulation of combustion products into the living space can create potentially hazardous conditions including carbon monoxide poisoning that could result in personal injury or death.

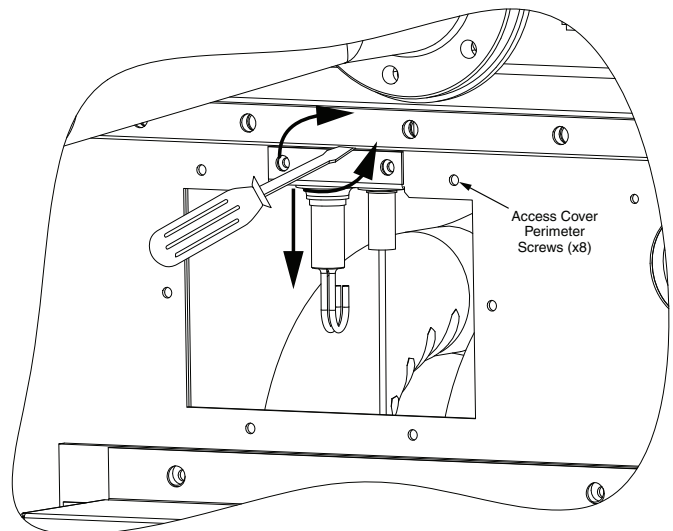


Figure 9. Ignitor Flame Sensor Bracket

TROUBLESHOOTING

If the unit does not operate in the cooling mode, check the following:

- Is the thermostat operating properly?
- Are the blower compartment doors in place?
- Is the furnace disconnect closed?
- Has the circuit breaker tripped or did any of the control board fuses burn open? **NOTE:** There are 2 fuses, one on the control board (3-amp) and one in a fuse holder (1.5-amp) to the right of the control board.
- Is the gas turned on?
- Are any manual reset switches open?
- Is the filter dirty or plugged?
- Is the flame sensor coated? (Remove and clean with steel wool. New gasket is required) See Cleaning of Flame Sensor section on [page 16](#).
- Are all the LED's on the furnace control board constantly ON? If not, refer to [Table 4](#) or the wiring diagram ([Figure 12 \(page 23\)](#) and [Figure 13 \(page 24\)](#)) to determine fault condition.

IMPORTANT NOTE: The furnace will lock out after 5 failed attempts for ignition and will try again every hour if the call for heat remains.

- If the inducer blower is operating and items above have been verified, check the limit switch circuit and reset if necessary. See [Figure 14 \(page 26\)](#) for component location.
- If the furnace operates when the limit switch circuit is reset, contact a qualified service technician to identify and repair the problem.
- If the furnace still doesn't operate, check the flame roll-out switch and reset if necessary. See [Figure 14](#) for component location.
- If the furnace operates when the flame rollout switch is reset, contact a qualified service technician to identify and repair the problem.

DIAGNOSTIC DESCRIPTION	GREEN LED	RED LED
Control Fault (No Power)	Off	Off
L1/Neutral Polarity Fault	Flash	Flash
1 Hour Lockout	Alternating Flash	
Normal Operation	On	On
Pressure Switch Closed Fault	On	Flash
Pressure Switch Open Fault	Flash	On
Open Limit Switch Fault	Flash	Off
DIAGNOSTIC DESCRIPTION	YELLOW LED	
Low Flame Sensor Signal	Continuous Flash	
Flame Present	On	

Table 4. Diagnostic Codes

FIGURES & TABLES

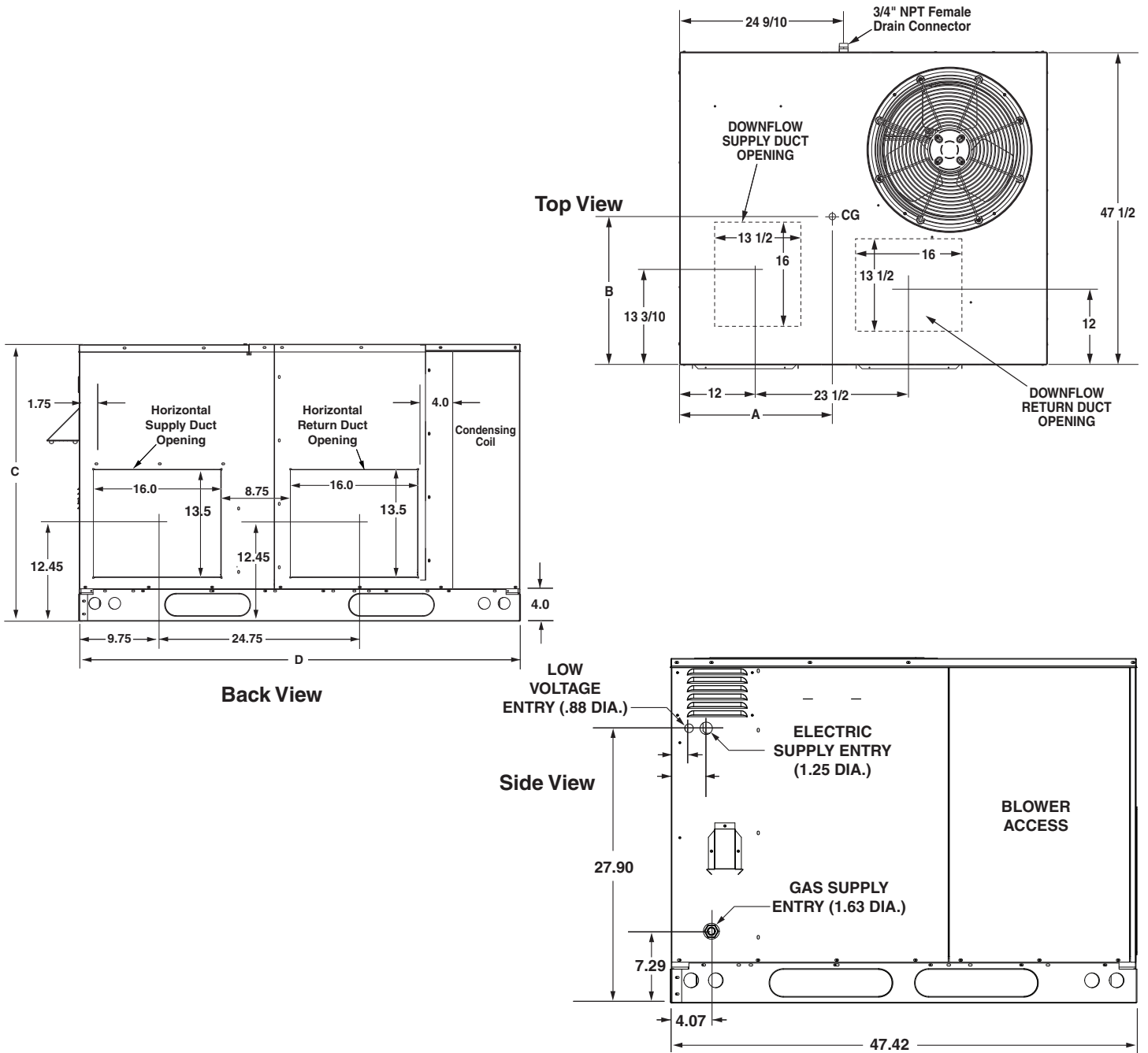


Figure 10. Unit Dimensions

MODEL NUMBER	UNIT WEIGHT	SHIPPING WEIGHT	CENTER OF GRAVITY		HEIGHT IN INCHES (C)	
			A	B	WITH BASE RAILS	WITHOUT BASE RAILS
4YCL4024B1055A	390	406	26.5	26.5	35.0	31.3
4YCL4030B1070A	390	406	26.0	26.5	35.0	31.3
4YCL4036B1070A	390	406	26.5	26.5	35.0	31.3
4YCL4042B1100A	438	455	27	26.5	39.0	35.3
4YCL4048B1100A	459	476	27	26.5	43.0	39.3
4YCL4060B1100A	490	507	27	27.5	47.0	43.3

Table 5. Center of Gravity & Unit Shipping Weights

Airflow Data

MODEL NUMBER	HEATING RISE RANGE	MOTOR TAP	EXTERNAL STATIC PRESSURE DROP - INCHES WATER COLUMN															
			0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
			(ACFM)	(°F) RISE	(ACFM)	(°F) RISE	(ACFM)	(°F) RISE	(ACFM)	(°F) RISE	(ACFM)	(°F) RISE	(ACFM)	(°F) RISE	(ACFM)	(°F) RISE	(ACFM)	(°F) RISE
4YCL4024B1055A	35-65	Tap T1**	996	41	898	46	800	52	750	55	726	57	632	65	552	75	470	88
		Tap T2																
		Tap T3																
		Tap T4																
		Tap T5																
4YCL4030B1070A	35-65	Tap T1	1243	42	1158	45	1076	49	984	53	906	58	845	62	782	67	762	69
		Tap T2**	1393	38	1310	40	1255	42	1172	45	1099	48	1021	51	955	55	899	58
		Tap T3																
		Tap T4																
		Tap T5																
4YCL4036B1070A	35-65	Tap T1	1243	42	1158	45	1076	49	984	53	906	58	845	62	782	67	762	69
		Tap T2**	1393	38	1310	40	1255	42	1172	45	1099	48	1021	51	955	55	899	58
		Tap T3																
		Tap T4																
		Tap T5																
4YCL4042B1100A	35-65	Tap T1	1098	68	1020	74	954	79	886	85	814	92	765	98	691	109	620	121
		Tap T2	1453	52	1384	54	1326	57	1267	59	1204	62	1137	66	1095	68	1031	73
		Tap T3**	1663	45	1605	47	1541	49	1489	50	1425	53	1366	55	1321	57	1260	60
		Tap T4																
		Tap T5																
4YCL4048B1100A	35-65	Tap T1	1153	65	1071	70	1002	75	930	81	855	88	803	93	726	103	651	115
		Tap T2**	1684	45	1597	47	1529	49	1467	51	1397	54	1323	57	1245	60	1171	64
		Tap T3																
		Tap T4																
		Tap T5																
4YCL4060B1100A	35-65	Tap T1	1589	47	1498	50	1391	54	1271	59	1165	64	1063	71	995	75	899	83
		Tap T2**	1803	42	1710	44	1621	46	1513	50	1416	53	1320	57	1241	60	1146	65
		Tap T3																
		Tap T4																
		Tap T5																

** Denotes factory set heating speed

Tap 1 is factory set fan speed

Data is ACFM

Table 6. Nominal Heating Airflow Rates & Temperature Rises (° F)

MODEL NUMBER	MOTOR TAP	EXTERNAL STATIC PRESSURE DROP - INCHES WATER COLUMN							
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
		SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
4YCL4024B1055A	Tap T1	810	730	650	610	590	514	449	382
	Tap T2	970	895	819	747	680	611	554	488
	Tap T3	1112	1050	987	903	837	776	707	641
	Tap T4*	1160	1105	1053	991	908	840	797	720
	Tap T5	1472	1411	1350	1295	1228	1164	1097	1051
4YCL4030B1070A	Tap T1	1036	965	897	820	755	704	652	635
	Tap T2	1161	1092	1046	977	916	851	796	749
	Tap T3	1294	1231	1178	1127	1066	1005	936	887
	Tap T4*	1333	1268	1213	1161	1098	1035	964	913
	Tap T5	1920	1872	1836	1785	1728	1699	1645	1592
4YCL4036B1070A	Tap T1	1036	965	897	820	755	704	652	635
	Tap T2	1161	1092	1046	977	916	851	796	749
	Tap T3	1333	1268	1213	1161	1098	1035	964	913
	Tap T4*	1439	1392	1340	1295	1250	1200	1145	1090
	Tap T5	1920	1872	1836	1785	1728	1699	1645	1592
4YCL4042B1100A	Tap T1	1098	1020	954	886	814	765	691	620
	Tap T2	1450	1380	1326	1267	1204	1137	1095	1031
	Tap T3*	1527	1469	1418	1357	1289	1243	1190	1132
	Tap T4	1950	1884	1842	1790	1743	1687	1637	1571
	Tap T5	2031	1992	1921	1871	1820	1770	1711	1650
4YCL4048B1100A	Tap T1	1098	1020	954	886	814	765	691	620
	Tap T2	1604	1521	1456	1397	1330	1260	1186	1115
	Tap T3	1663	1605	1541	1489	1425	1366	1231	1260
	Tap T4*	1871	1806	1747	1693	1631	1575	1509	1449
	Tap T5	2031	1992	1921	1871	1820	1770	1711	1650
4YCL4060B1100A	Tap T1	1292	1218	1131	1033	947	864	809	731
	Tap T2	1466	1390	1318	1230	1151	1073	1009	932
	Tap T3	1774	1719	1661	1599	1529	1448	1384	1306
	Tap T4*	2024	1973	1919	1857	1798	1731	1668	1600
	Tap T5	2144	2087	2028	1962	1911	1849	1785	1718

* Denotes factory set cooling speed

Tap 1 is factory set fan speed

Data is with a dry coil

Table 7. Nominal Cooling Airflow Rates & Temperature Rises (° F)

Gas Information

CAPACITY OF BLACK IRON GAS PIPE (CU. FT. PER HOUR) FOR NATURAL GAS (SPECIFIC GRAVITY - 0.60)								
NOMINAL PIPE DIAMETER (IN.)	LENGTH OF PIPE RUN (FEET)							
	10	20	30	40	50	60	70	80
1/2	130	90	75	65	55	50	45	40
3/4	280	190	150	130	115	105	95	90
1	520	350	285	245	215	195	180	170
1 1/4	1,050	730	590	500	440	400	370	350
1 1/2	1,600	1,100	890	760	670	610		
Cubic Feet Per Hour Required = $\frac{\text{Input To Furnace (Btu/hr)}}{\text{Heating Value of Gas (Btu/Cu. Ft.)}}$								

NOTE: The cubic feet per hour listed in the table above must be greater than the cubic feet per hour of gas flow required by the furnace. To determine the cubic feet per hour of gas flow required by the furnace, divide the input rate of the furnace by the heating value (from gas supplier) of the gas.

Table 8. Gas Pipe Capacities

GAS FLOW RATES (CUBIC FEET PER HOUR)			
TIME FOR ONE REVOLUTION (SECONDS)	CUBIC FEET PER REVOLUTION OF GAS METER		
	1	5	10
10	360	1,800	3,600
12	300	1,500	3,000
14	257	1,286	2,571
16	225	1,125	2,250
18	200	1,000	2,000
20	180	900	1,800
22	164	818	1,636
24	150	750	1,500
26	138	692	1,385
28	129	643	1,286
30	120	600	1,200
32	113	563	1,125
34	106	529	1,059
36	100	500	1,000
38	95	474	947
40	90	450	900
42	86	429	857
44	82	409	818
46	78	391	783
48	75	375	750
50	72	360	720
52	69	346	692
54	67	333	667
56	64	321	643
58	62	310	621
60	60	300	600
62	58	290	581
64	56	281	563

GAS FLOW RATES (CUBIC FEET PER HOUR)			
TIME FOR ONE REVOLUTION (SECONDS)	CUBIC FEET PER REVOLUTION OF GAS METER		
	1	5	10
66	55	273	545
68	53	265	529
70	51	257	514
72	50	250	500
74	49	243	486
76	47	237	474
78	46	231	462
80	45	225	450
82	44	220	439
84	43	214	429
86	42	209	419
88	41	205	409
90	40	200	400
92	39	196	391
94	38	191	383
96	38	188	375
98	37	184	367
100	36	180	360
102	35	176	353
104	35	173	346
106	34	170	340
108	33	167	333
110	33	164	327
112	32	161	321
114	32	158	316
116	31	155	310
118	31	153	305
120	30	150	300

Table 9. Gas Flow Rates

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.

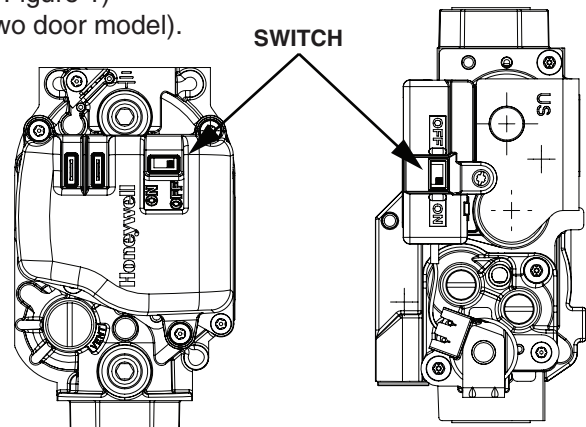
- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

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.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or move by hand, do not 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 the lowest setting.
3. Turn off all electrical power to the appliance.
4. The appliance's ignition device automatically lights the burner. Do not try to light burner by hand.
5. Remove the control access door/panel (upper door if two-door model).
6. Move the gas control switch to the "OFF" position. (See Figure 1)
7. 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 above information. If you don't smell gas, go to the next step.
8. Move the gas control switch to the "ON" position. (See Figure 1)
9. Replace the control access door/panel (upper door if two door model).
10. Turn on all electrical power to the appliance.
11. Turn the thermostat to a desired setting.
12. If the appliance will not operate, follow the 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 the lowest setting.
2. Turn off all electrical power to the appliance if service is to be performed.
3. Remove the control access door/panel (upper door if two-door model).
4. Move the gas control switch to the "OFF" position. Do not use force. (See Figure 1)
5. Replace the control access door/panel (upper door if two-door model).



10186330 (Replaces 7106740)
(10/17)

Figure 11. Gas Valve Label

Wiring Diagram & Electrical Data

WIRING DIAGRAM

Packaged Ultra Low NOx Single Stage Gas Heat/Electric Air Conditioner 230 Volt Single Phase 60Hz

NOTES:

1. Disconnect all power before servicing.
2. For supply connection use copper conductors only.
3. Not suitable on systems that exceed 150V to ground.
4. If any of the original wire as supplied with the furnace must be replaced, it must be replaced with wiring material having a temperature rating of at least 105C.
5. For supply wire ampacities and overcurrent protection, see unit rating plate.
1. Couper le courant abantaire letretien.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150V a la terre.

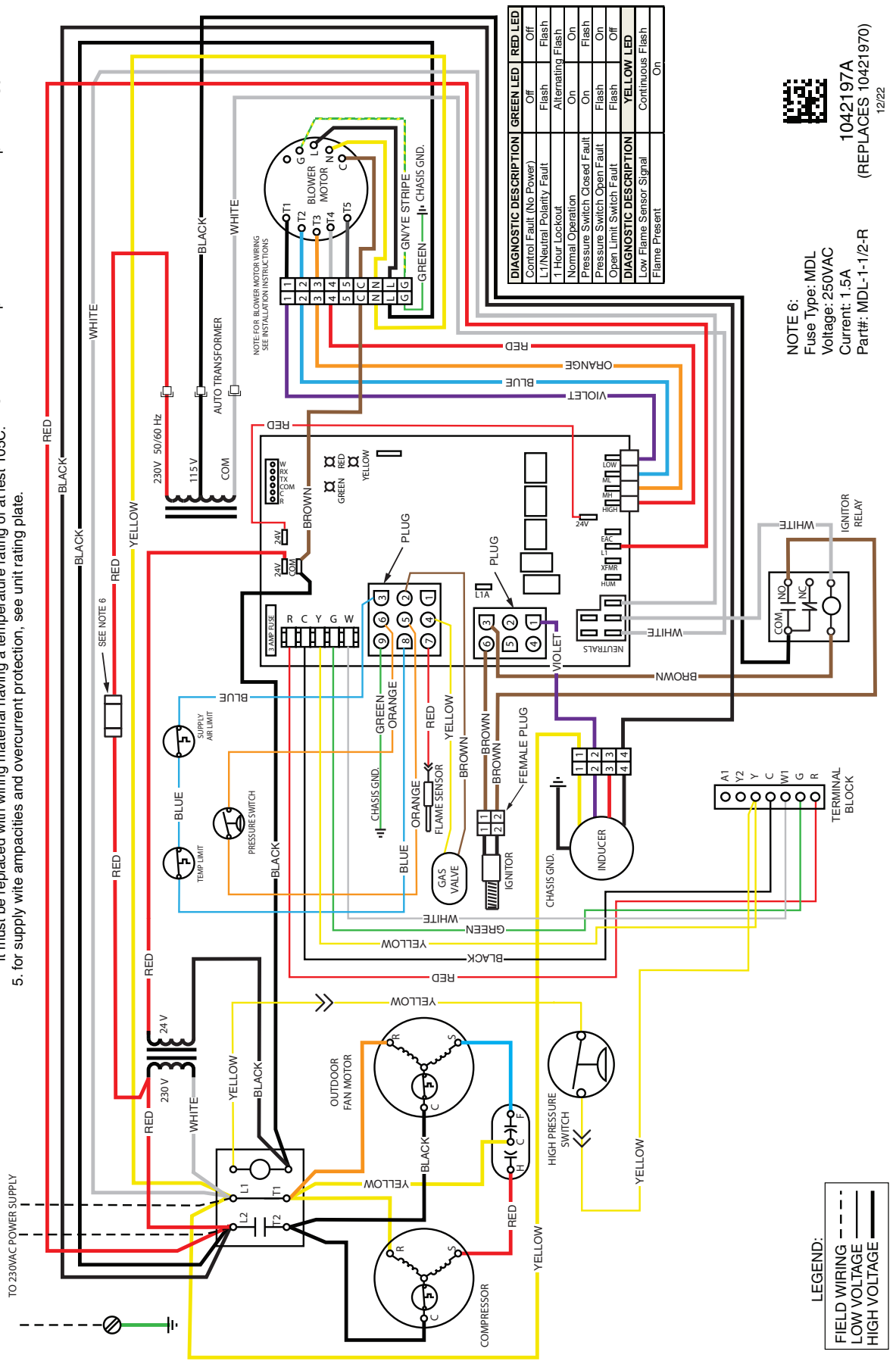


Figure 12. Wiring Diagram for 230V / 60 Hz Unit

Wiring Diagram & Electrical Data

WIRING DIAGRAM

Packaged Ultra Low NOx Single Stage Gas Heat/Electric Air Conditioner 230 Volt Single Phase 60Hz

NOTES:

1. Disconnect all power before servicing.
2. For supply connection use copper conductors only.
3. Not suitable on systems that exceed 150V to ground.
4. If any of the original wire as supplied with the furnace must be replaced, it must be replaced with wiring material having a temperature rating of at least 105C.
5. For supply wire ampacities and overcurrent protection, see unit rating plate.
1. Couper le courant abantaire letretien.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150V a la terre.

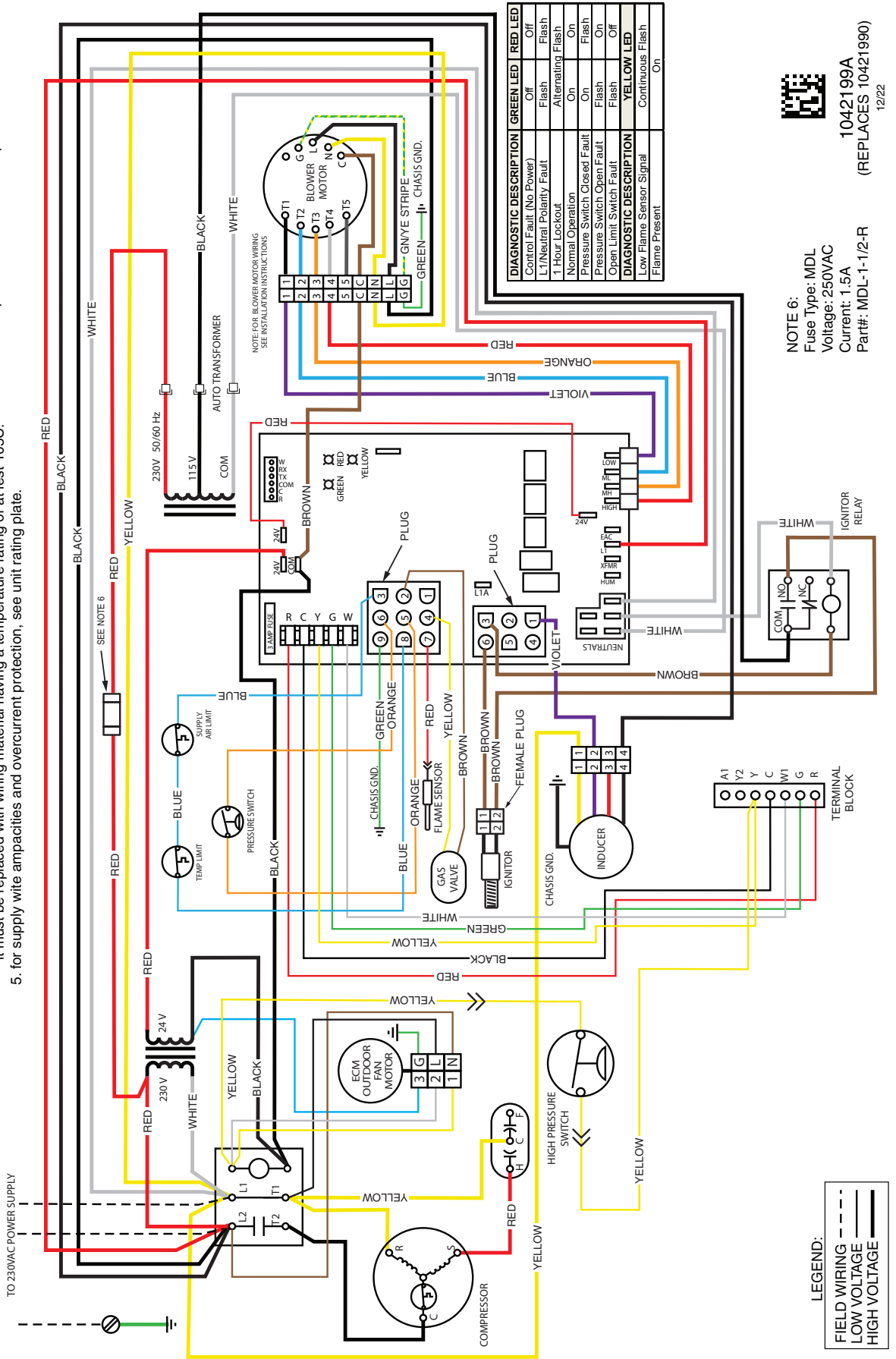


Figure 13. Wiring Diagram for 230V / 60 Hz Unit with ECM Outdoor Motor

MODEL NUMBER	HEATING INPUT (BTUH)	NOMINAL ELECTRICAL SUPPLY	VOLTAGE RANGE		COMPRESSOR		FAN AMPS	BLOWER AMPS	INDUCER MOTOR AMPS	MINIMUM CIRCUIT AMPACITY	MAXIMUM OVER-CURRENT PROTECTION
			MIN.	MAX.	RLA	LRA					
024K	55,000	230-60-1	196	253	12.8	58.3	1.0	3.8	0.7	20.8	30
030K	70,000	230-60-1	196	253	14.1	73	1.46	5.4	0.7	24.5	35
036K	70,000	230-60-1	196	253	16.7	79	1.46	5.4	0.7	27.7	40
042K	100,000	230-60-1	196	253	19.8	110	3.8	5.4	0.7	34.0	50
048K	100,000	230-60-1	196	253	21.8	117	1.46	5.4	0.7	34.1	50
X60K	100,000	230-60-1	196	253	26.3	134	1.46	7.0	0.7	41.3	60

NOTE: FLA = Full Load Amps; LRA = Lock Rotor amps; RLA = Rated Load Amps.

Table 10. Electrical Data.

REFRIGERANT CHARGING

WARNING:

These units are shipped fully charged with R-410A refrigerant and ready for installation. When a system is installed according to these instructions, no refrigerant charging is required. If repairs make it necessary for evacuation and charging, it should only be done by qualified, trained personnel thoroughly familiar with this equipment. Some local codes require licensed installation/service personnel to service this type of equipment. Under no circumstances should the owner attempt to install and/or service this equipment. Failure to comply with this warning could result in property damage, personal injury, or death.

CAUTION:

This unit uses R-410A refrigerant. DO NOT use any other refrigerant in this unit. Use of another refrigerant may damage the unit.

The system refrigerant charge can be checked and adjusted through the service ports provided at the front panel. Use only gauge lines which have a "Schrader" depression device present to actuate the valve. Draw a vacuum on gauge lines to remove air before attaching them to the service ports on the unit. Refrigerant charging must be done by qualified personnel familiar with safe and environmentally responsible refrigerant handling procedures.

Application Notes & Charging Charts

(Cooling Mode Only)

This equipment's cooling system contains refrigerant under high pressure, always use safe practices when servicing the unit. Always review the factory literature and safety warnings prior to servicing.

These units are shipped from the factory with the proper amount and type of refrigerant. Always inspect the unit rating label to determine the units information prior to working on the system. Do not mix different refrigerants or charge the unit with a refrigerant not listed on the unit rating label.

The charging tables are valid for a variety of indoor, return air conditions and are most highly influenced by the outdoor ambient temperature, outdoor fan operation and the unit operating voltage. Before referencing the charts, always make sure that the compressor circuit is energized on nominal speed (Y1 energized) and has stable operation. As can be seen in the charging charts, the ideal system sub-cooling can vary over the range of operation. Always reference the charts to determine the ideal amount of sub-cooling for a given liquid pressure. Units charged to other values will not perform at the rated unit efficiency (EER).

To inspect a systems operation, using quality instruments, match the measured liquid temperature to the units chart. The measured liquid pressure reading should be within 3% of the value shown for most installations.

For systems operating with more than a 5% deviation, inspect the unit for leaks. Always use safe and environmentally sound methods for refrigerant handling. When repairing system leakages, always utilize a nitrogen (inert) gas to protect the refrigerant system and pressure check the repair before re-charging. Always replace the filter-dryers when performing any repair to the refrigeration system. After completing the repairs, evacuate the system to 350-500 microns and weigh in the refrigerant to the amount specified on the unit rating label.

FURNACE COMPONENTS

The descriptions below are various functional components that affect the operation and shutting down of this furnace. Some of these components and their locations are shown in [Figure 14](#). If any component of the furnace must be replaced, use only factory authorized replacement parts specified in the Replacement Parts List.

Flame Sensor - Verifies when a flame is present. If no flame is detected, the furnace will shut down within 4 seconds.

Gas Valve - Controls the flow of gas to the burners. When the gas valve is energized it automatically opens and regulates the gas pressure in the manifold.

Inducer Assembly - Vents products of combustion to the outside.

Pressure Switch - Verifies the inducer is drawing the combustion gases through the heat exchanger. The pressure switch prevents furnace operation with excessive flue blockage or improper inducer operation.

Main Air Limit Switch - Prevents the air temperature leaving the furnace from exceeding the maximum allowable outlet air temperature.

Temperature Limit Switch - Verifies the inducer is drawing combustion gases through the heat exchanger properly. The temperature switch prevents furnace operation in the event of flue or combustion air passageway blockage, or improper inducer operation. If the roll-out switch opens, the gas valve will close and initiate the shutdown cycle. The blower will run continuously due to open limit fault.

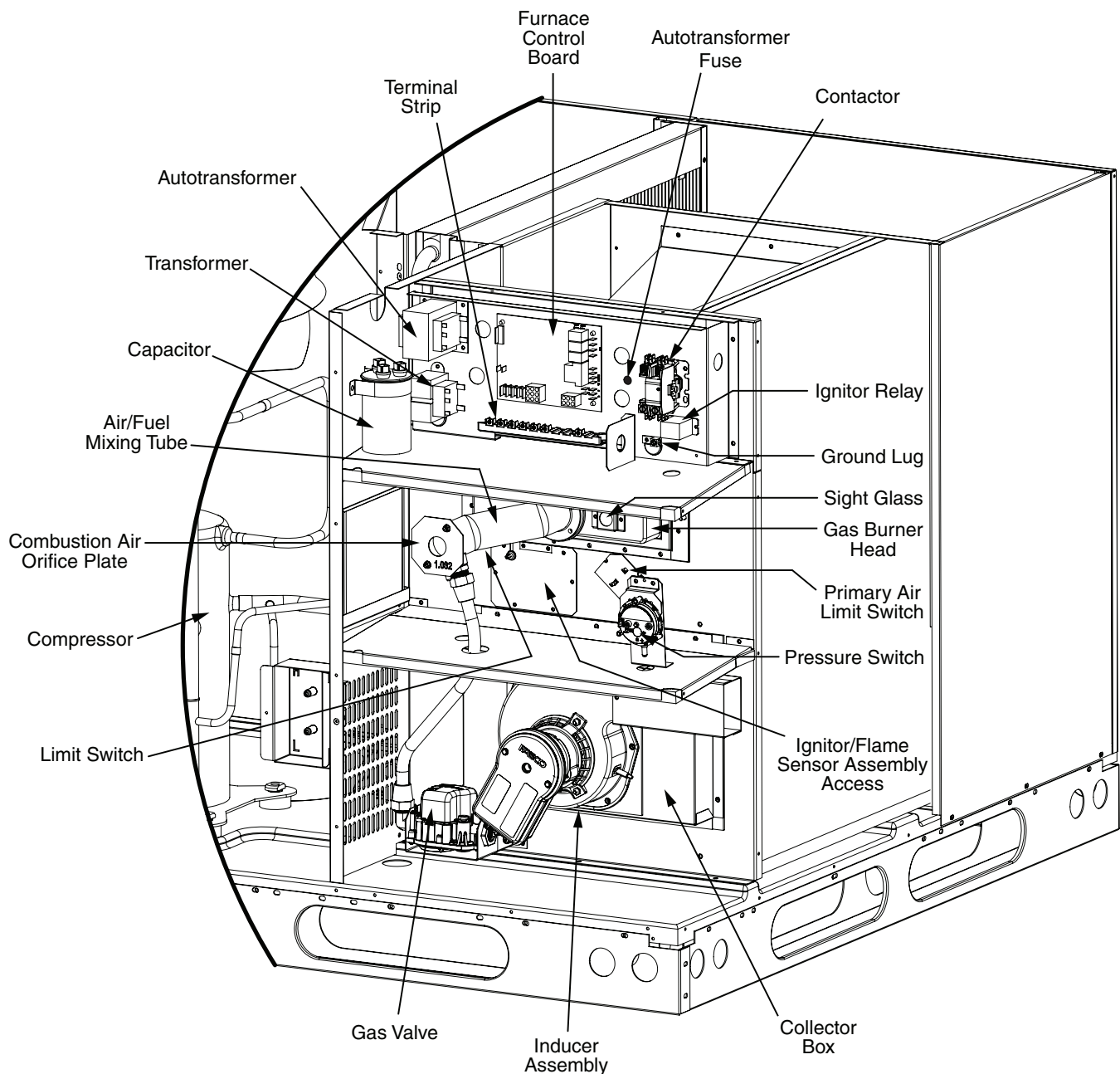


Figure 14. Component Locations

INSTALLATION CHECKLIST

INSTALLATION ADDRESS:		
CITY:	STATE:	
UNIT MODEL #		
UNIT SERIAL #		
Unit Installed Minimum clearances per Figure 1 (page 5)?	YES	NO
INSTALLER NAME:		
CITY:	STATE:	
Has the owner's information been reviewed with the customer?	YES	NO
Has the Literature Package been left with the unit?	YES	NO

ELECTRICAL SYSTEM		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Rated Voltage (VOLTS):		
L1-L2 Volts:		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the heat anticipator setting correct? (If Applicable)	YES	NO

VENTING SYSTEM		
Is the vent hood installed?	YES	NO
Is vent hood free from restrictions	YES	NO
Filter(s) secured in place?	YES	NO
Filter(s) clean?	YES	NO

ATTENTION INSTALLERS:

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the unit or failure to follow safety warnings could result in serious injury, death, or property damage. These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment.

GAS SYSTEM		
Gas Type: (circle one)	Natural Gas	Propane
Gas pipe connections leak-tested?	YES	NO
Gas Line Pressure (in - W.C.):		
Is there adequate fresh air supply for combustion and ventilation?	YES	NO
Installation Altitude (FT.):		
Deration Percentage:		
Unit Input (Btuh):		
Supply Air Temperature (° F):		
Return Air Temperature (° F):		
Temperature Rise (° F):		
DURING UNIT OPERATION:		
Manifold pressure (in - W.C.):		

REFRIGERATION SYSTEM		
Was unit given 24 hr warm up period for crankcase heaters (if equipped)?	YES	NO
Stage-1 Liquid Pressure (high side):		
Stage-1 Suction Pressure (low side):		

REPLACEMENT PARTS

Replacement parts are available through your distributor. Please have the complete model and serial number of the unit when ordering replacement parts.

ELECTRICAL:

- Capacitors
- Compressors
- Contactors
- Gas Valves
- Ignition Controls
- Ignitors/Flame Sensors
- Pressure Switches
- Relays
- Temperature Limit Switches
- Thermostats
- Time Delay Relays
- Transformers

MOTORS:

- Blower Motor
- Fan Motor
- Inducer Blower Motor

COMPONENTS:

- Blower Assembly
- Burner Manifold
- Burners/Orifices
- Cabinet Panels
- Expansion Valves
- Fan Grille
- Filter/Driers
- Gaskets
- Heat Exchanger



1043684A
(Replaces 10436840)



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