

Downflow, Upflow Electric Furnaces

Owners Manual & Installation Instructions

E3 Series (Air Conditioner/Heat Pump Air Handler)



IMPORTANT

User, please read this information thoroughly and become familiar with the capabilities and use of your appliance before attempting to operate or maintain this unit. Keep this literature where you have easy access to it in the future. If a problem occurs, check the instructions and follow recommendations given. If these suggestions don't eliminate your problem, call your servicing contractor.

The Installation 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. Please read all instructions carefully before starting the installation.

**DO NOT DESTROY. PLEASE READ CAREFULLY AND
KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.**

TABLE OF CONTENTS

USER INFORMATION

IMPORTANT SAFETY INFORMATION	3	UNIT MAINTENANCE	4
OPERATING INSTRUCTIONS	3	Furnace Filter.....	4
Cooling Operation	3	Coil Filter.....	4
Heating Operation	3	Blower Compartment	4
Operating the Blower Continuously.....	3	TROUBLESHOOTING	4
Turning the Heater OFF	4		

INSTALLER INFORMATION

IMPORTANT SAFETY INFORMATION	5	Standard Duct Connector Installation	10
REQUIREMENTS & CODES	5	Narrow Duct Connector Installation	10
Minimum Installation Clearance	5	Round Duct Connector Installation	11
Clearances to Combustible Materials	5	Alcove Installations	11
CIRCULATING AIR REQUIREMENTS	6	Closet Installations.....	11
Plenums & Air Ducts	6	Downflow Furnaces.....	11
Return Air Connections.....	6	Upflow Furnaces	12
Supply Air Connections.....	6	Over the Floor Return Air (Non-Ducted)	12
Acoustical Ducts	6	Through the Floor Return Air (Ducted)	13
Unconditioned Spaces.....	7	ELECTRICAL WIRING	13
Closed-Off Spaces	7	Line Voltage Wiring.....	13
Filtering Methods - Downflow Furnaces	7	Connecting Supply Service Wires	14
Non-Ducted Return Air	7	Grounding.....	14
Without AC or HP Uncased Coil.....	7	Thermostat / Low Voltage Connections	14
With AC or HP Uncased Coil	7	Selecting Blower Speed	14
With Optional Coil Housing.....	7	Changing Blower Speed.....	15
Ducted Return Air	7	Blower Installation	15
Without Optional Coil Housing.....	7	Installing Control Circuit Wiring	15
With Optional Coil Housing.....	7	START-UP & ADJUSTMENTS	16
Filtering Methods - Upflow Furnaces.....	7	Pre-Start Checklist	16
Non-Ducted Return Air	7	Start-Up Procedures.....	16
Without Optional Upflow Stand.....	7	FIGURES & TABLES	17
With Optional Upflow Stand.....	7	Figure 20. Furnace Components	17
Ducted Return Air	7	Figure 21. Furnace Physical Dimensions.....	18
FURNACE INSTALLATION	8	Figure 22. Upflow Stand Dimensions	18
General Information	8	Table 6. Unit Specifications	19
Before You Install this Furnace.....	8	Table 7. Electrical Specifications	20
Locating the Unit	8	Figure 23. E3EB-010H Wiring Diagram.....	21
Optional Equipment.....	8	Figure 24. E3EB-012H Wiring Diagram.....	22
Return Air Grille	8	Figure 25. E3EB-015H & 017H W.D.....	23
Automatic Furnace Damper.....	8	Figure 26. E3EB-020H, 023H, & 5 Ton W.D.	24
Duct Connectors for Downflow Systems.....	8	INSTALLATION PERFORMANCE CHECKLIST	28
Locating & Cutting Floor Openings	9		

USER INFORMATION

IMPORTANT SAFETY INFORMATION

Safety markings are used 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:

Improper service, adjustment or maintenance of unit may cause fire, electrical shock, or hazardous conditions which may result in personal injury, property damage, or death. Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment

WARNING:

Do not store or place flammable or vaporous materials (paint thinners, etc.) in the vicinity of this appliance. Failure to comply may cause fire, explosion, or other hazardous conditions which may result in serious injury, death or property damage.

The following list of chemicals should not be used or stored near the furnace:

- Chlorinated cleaners
- Water softening chemicals
- De-icing salts or chemicals
- Household Cleaning Solutions
- Printing inks, paint removers, varnishes, etc.
- Cements and glues
- Antistatic fabric softeners

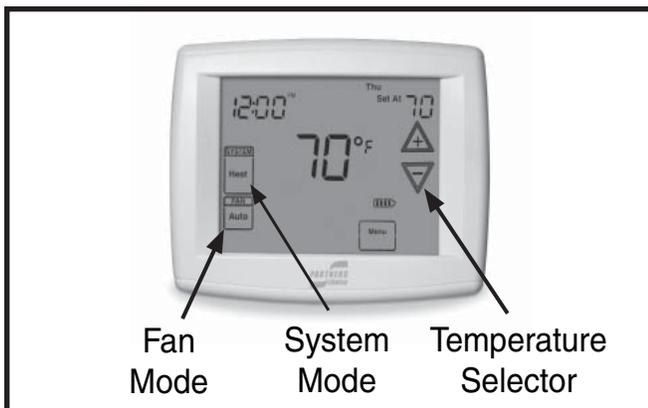


Figure 1. Digital Thermostat

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 any electrical or control system parts that have been wet or under water.

OPERATING INSTRUCTIONS

NOTE: Thermostat styles vary. Some models may not include the AUTO mode and others will have the AUTO in place of the HEAT and COOL. Others may include all three. Please refer to the thermostat manufacturer's User manual for detailed programming instructions.

NOTE: Allow at least one hour for the room temperature to stabilize before you make a second adjustment to the thermostat setting. After the desired comfort level is established, make only small adjustments to the thermostat setting to meet changing temperature conditions.

Cooling Operation

1. Set the thermostat's system mode to COOL or AUTO and change the fan mode to AUTO. See Figure 1.
2. Set the temperature selector to the desired temperature level. The outdoor fan, compressor, and blower motor will all cycle on and off to maintain the indoor temperature at the desired cooling level.

Heating Operation

1. Set the thermostat's system mode to HEAT or AUTO and change the fan mode to AUTO. See Figure 1.
2. Set the temperature selector to the desired temperature level. The compressor, outdoor fan, and blower motor will cycle on and off to maintain the indoor temperature at the desired heating level.

Operating the Indoor Blower Continuously

The continuous indoor blower operation is typically used to circulate the indoor air to equalize a temperature unbalance due to a sun load, cooking, or fireplace operation.

Set the thermostat fan mode to ON (Figure 1). The indoor blower starts immediately, and will run continually until the fan mode is reset to AUTO.

The continuous indoor blower operation can be obtained with the thermostat system mode set in any position, including OFF.

USER INFORMATION

Turning the Heater OFF

Change the thermostat's system mode to OFF and the fan mode to AUTO (See Figure 1). **NOTE:** The system will not operate, regardless of the temperature selector setting.

CAUTION:

For optional A/C or H/P systems, always wait at least five minutes after the system shuts off before restarting the system.

UNIT MAINTENANCE

WARNING:

Shut off all electrical power to the unit before performing any maintenance or service on the system. Failure to comply may result in personal injury or death.

CAUTION:

There are No user serviceable parts inside the control panel. DO NOT OPEN.

NOTE: All servicing of this heating appliance other than the normal maintenance described in this section must be done by authorized trained service personnel. Do not attempt any servicing which requires opening of the control panels.

- Proper maintenance is most important to achieve the best performance from the appliance and should be performed frequently at the beginning of each heating season.
- Keep the area surrounding the unit clean. Keep the unit clear of obstructions.

Furnace Filter

WARNING:

Never operate the furnace without a filter in place. Accumulating dust in the return air can build up on internal components, resulting in loss of efficiency, equipment damage, and possible fire.

- E3 Furnaces are supplied with a single air filter when shipped from the factory. It is recommended that the filter be cleaned or replaced monthly. Newly built or recently

renovated homes may require more frequent changing until the construction dust has minimized. Filter sizes shown in Table 6 (page 19) are available at most local retailers. Inspect filters frequently and replace when necessary with filter of same dimensional size

- Filters designed to remove smaller particles such as pollen, may require additional maintenance.

Coil Filters

If a cooling coil is installed on your unit, the furnace filter is not used. Remove coil filters, wash, and allow to dry. Re-install coil filters to their original positions.

Blower Compartment

Dirt and lint can create excessive loads on the motor resulting in higher than normal operating temperatures and shortened service life. Vacuum or wipe clean the interior of furnace cabinet. Clean all lint and dust from around the furnace. It is recommended that the blower compartment be cleaned of dirt or lint that may have accumulated in the compartment or on the blower and motor as part of regular maintenance.

TROUBLESHOOTING

If the unit fails to operate, check the following:

- Check the thermostat setting. Make sure the system mode and temperature settings are correct.
- Check the electrical panel for tripped circuit breakers.
- Check the filters for dust accumulation.
- Check the unit and make sure it is clean and not covered with grass or leaves.
- If the items above don't resolve your problems, then call your nearest service technician. Please specify the complete model and serial numbers shown on the furnace data label for all warranty service and when ordering replacement parts or optional equipment. Refer to the replacement parts list provided with the furnace for part numbers.

INSTALLER INFORMATION

IMPORTANT SAFETY INFORMATION

INSTALLER: 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.

REQUIREMENTS & CODES

WARNING:

This unit must be installed in accordance with instructions outlined in this manual 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.

- 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 (NEC) for special installation requirements.
- 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 (CSA Z240.6.1, & Z240.9.1).
- Design and construction of the home duct system, must be in accordance with: HUD Manufactured Home Construction & Safety Standard (Title 24, Part 3280) and American National Standards (ANSI) A119.11, C1-NFPA 7
- 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.
- This air handler may not be used for temporary heating of buildings or structures under construction.

Minimum Installation Clearances

- Access for positioning and servicing the unit must be considered when locating unit. The need to provide clearance for access to panels or doors may require clearance distances over and above the requirements. **For alcove installations allow 18 (46cm) inches minimum clearance from the front of the unit for future servicing. Closet installations require 36 inches minimum.**
- This appliance must be installed in accordance with clearances listed in Table 1. The furnace must be installed with ample clearance for easy access to the air filter, blower assembly, burner assembly, controls, and vent connections.
- Locate and install this unit in position as specified on page 8. This unit is designed only for Indoor installations and should be located with consideration of minimizing the length of the supply and return ducts. See Table 4 (page 15) or the rating plate for circulating airflow data.
- Sufficient clearance for unobstructed airflow through a louvered door must be maintained in order to achieve rated performance. Air return to the furnace must have the minimum required total free area:
200 in² (1290 cm²) for furnace only. May also include return air grille and frame assembly P/N 902989 or wall mount grille P/N 902999).
235 in² (1516 cm²) with 4 ton A.C. or H.P. installed.
250 in² (1613 cm²) with 4 ton A.C. or H.P. installed & 1" special clearance.
390 in² (2516 cm²) with up to 5 ton A.C. or H.P. installed.

Clearances to Combustible Materials

- This furnace is Design Certified in the U.S. and Canada by CSA International for the minimum clearances to combustible materials. **NOTE:** The furnace is listed for installation on combustible or non-combustible flooring. To obtain specific clearance information, refer to the furnace rating plate, located inside of the furnace cabinet.
- 0" from all surfaces of furnace cabinet, ducts, optional coil housing and plenum connector. No separate subbase required for installations on combustible flooring.

ALL MODELS	CLOSET	ALCOVE
Front **	6"	18"
Back	0"	0"
Sides*	0"	0"
Top	0"	0"
Top & Sides of Duct	0"	0"
Bottom of Duct	0"	0"

** Service Clearance

* For upflow application using upflow stand, 1" minimum per side.

Table 1. Minimum Clearance Requirements

CIRCULATING AIR REQUIREMENTS

WARNING:

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

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

Plenums & 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.

- Plenums and air ducts must be installed in accordance with the Standard for the Installation of Air Conditioning and Ventilating Systems (NFPA No. 90A) or the Standard for the Installation of Warm Air Heating and Air Conditioning Systems (NFPA No. 90B).
- Design the air ducts according to methods described by the Air Conditioning Contractors of America (ACCA).
- Air ducts must be aluminum, tin plate, galvanized sheet steel, or other approved materials for outlet or return air ducts.
- Snap-Lock or Pittsburgh-Lock seams are preferred. All other types of seams must be made tight to prevent leakage.
- It is good practice to seal all connections and joints with industrial grade sealing tape or liquid sealant. Requirements for sealing ducts vary from region to region. Consult with local codes for requirements specific to your area.
- Gas piping must not run in or through any of the air duct system.
- Applicable installation codes may limit the furnace to installation in a single-story residence only. Furnace installations other than closet or alcove require ducted return air systems.

Return Air Connections

Air return to the furnace must have a minimum free area opening (see Table 1). A return air grille for closet or alcove installations is available. Acceptable closet installations with return air entering through an opening in the floor or ceiling of a closet, must meet all of the following requirements:

- The return air opening, regardless of its location in the closet, must not be smaller than size specified on unit data label. If located in the floor, the opening must be provided with a means of preventing its inadvertent closure by flat object(s) placed over the opening.
- A return air grille must be used when furnace is installed in a closet or alcove:
 - Alcove installations: use return air grille & frame assembly P/N 902989 or equivalent. See Figure 2, page.
 - Closet installations: use wall mount return air grilled P/N 902999 or equivalent. **NOTE:** For 5 ton A.C. or H.P. system, 155 in² (1,000 cm²) must be added.
 - Downflow alcove installations: the grille (with frame provided) may be attached to the top of the furnace and all paneling and trim flushed to it. This installation provides an access door for future installation of NORDYNE air conditioning or heat pump coils on top of the furnace.
- Materials located in return air duct system must have a flame-spread classification of 200 or less.
- Noncombustible pans having 1" upturned flanges must be located beneath openings in a floor-return duct system.
- Wiring materials located in return duct system must conform to NEC Article 300-22(c).
- If return air opening is located below top of furnace, a minimum clearance must be provided between opening and furnace. See Table 1 (page 5).

Supply Air Connections

- Supply duct system must be designed for proper air distribution. Static pressure measured externally to furnace shall not exceed static pressure rating listed on furnace nameplate.
- Duct system must be designed so that no supply registers are located in duct system directly below the furnace.

Acoustical Ducts

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.

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

Closed-Off Spaces

Living space not served by, and closed off from the return air ducts to the furnace (by doors, sliding partitions, and other means) must be provided with permanent, uncloseable openings in the doors or partitions to allow air to return to the furnace from all parts of the home. Return air grilles, with a minimum open area of one square inch for every five square feet of living space closed off from the furnace, must be provided in the door or room partition.

Filtering Methods - Downflow Furnaces

Non-Ducted Return Air

For unducted return air systems, either the optional grille and frame assembly or the optional wall mount grille is recommended.

Without A/C or H/P uncased coil:

- Use the filter supplied with the furnace; ensure that the filter is installed mat side down between the filter retainer and furnace top. See Figure 2.

With A/C or H/P uncased coil:

- Use the optional coil filters; the filter supplied with the furnace is not used; REMOVE AND DISCARD THIS FILTER.

With optional coil housing:

- See coil cabinet instructions for specific filtering methods.

Ducted Return Air

For ducted return air systems with air conditioners or heat pumps, either providing an access panel in the duct or using the optional coil cabinet (Figure 3) is recommended. The duct system must be properly sized to account for any additional external static pressure produced from the chosen filtering method.

Without optional coil housing:

- Install a filter with a minimum unrestricted medium area of 324 in² in the duct above the coil that is accessible for monthly cleaning or replacement by homeowner.

With optional coil housing:

- Install a filter with a minimum unrestricted medium area of 324 in² in the duct above the coil that is accessible for monthly cleaning or replacement by homeowner.

Filtering Methods - Upflow Furnaces

Non-Ducted Return Air

Furnaces may be installed with unducted or ducted return air. For unducted systems with air conditioners or heat pumps, the following optional equipment is recommended: upflow stand, coil cabinet, upflow duct connector, and wall mount grille.

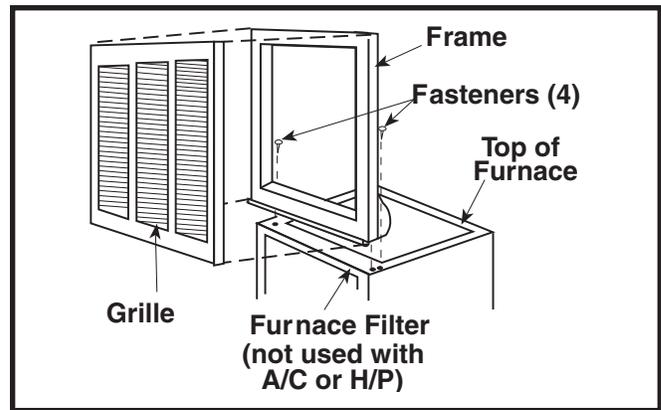


Figure 2. Grille Support Frame & Grille Assembly

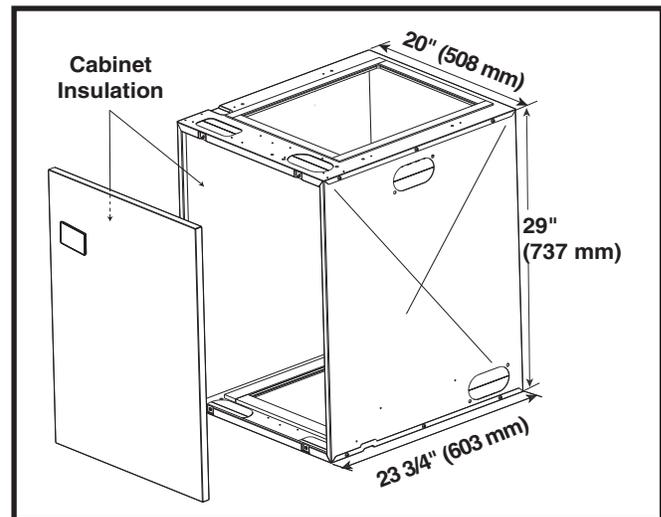


Figure 3. Upflow Coil Cabinet

Without optional upflow stand:

- Install a filter with a minimum unrestricted medium area of 324 in² below the coil cabinet/furnace assembly that is accessible for monthly cleaning or replacement by the homeowner

With optional upflow stand:

- Stand (Figure 4, page 8) must use two filters: one is supplied with the stand and the other MUST be removed from the furnace and placed in the stand. See instructions supplied with the upflow stand for additional details.

Ducted Return Air

For ducted systems with air conditioners or heat pumps, the following optional equipment is recommended: coil cabinet and upflow duct connector.

- Install a filter with a minimum unrestricted medium area of 324 in² below the coil cabinet/furnace assembly that is accessible for monthly cleaning or replacement by the homeowner

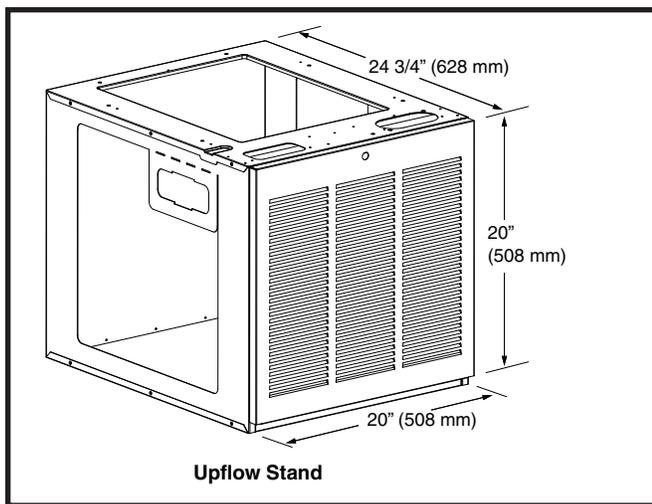


Figure 4. Optional Upflow Stand

FURNACE INSTALLATION

NOTE: Since all installations are different, the sequence of these steps may differ from the actual installation. These installation procedures are suggested for typical furnace installations. **Only qualified HVAC technicians should install this furnace.**

General Information

The E3 Electric furnace is designed only for indoor installations and can be readily connected to the high static duct system of a home. Units are approved for single/multistory residential or mobile/modular/manufactured structures in upflow, downflow, (freestanding/closet/alcove) configurations.

This appliance will provide many years of safe and dependable comfort, providing it is properly installed and maintained. Abuse, improper use, and/or improper maintenance can shorten the life of the appliance and create unsafe hazards. Please read all instructions before installing the unit.

Approved installation, operation, and maintenance of this appliance must be in accordance with the listed specifications contained in these instructions and other documents supplied with the furnace and/or optional air conditioning equipment. Unless it is noted differently in this manual, only use factory authorized kits and accessories when modifying this appliance. Refer to local authorities having jurisdiction for further information.

Before You Install this Furnace

- √ This equipment is securely packaged 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.
- √ Check the electrical supply and verify the power supply is adequate for unit operation. The system must be wired and provided with circuit protection in accordance with

local building codes. If there is any question concerning the power supply, contact the local power company.

- √ Verify the air delivery of the furnace is adequate to handle the static pressure drop of the coil, filter, and duct work.

Locating the Unit

- Survey the job site to determine the best location for installing the unit. Consideration should be given to availability of electric power, service access, and noise.
- The dimensions of the room or alcove must be able to accommodate the overall size of the unit and the installation clearances in Table 1 (page 5). Physical dimensions for this furnace are shown in Figure 21 (page 18). If an upflow stand will be used, see Figure 22 for component dimensions.
- The unit must be leveled at installation and attached to a properly installed duct system.
- The surface that the furnace is mounted on must provide sound physical support of the unit.

Optional Equipment

NOTE: Refer to the instructions supplied with any additional accessories for further installation details.

Return Air Grille

A return air grille and frame assembly (Figure 2, page 7) is available for use in unducted return air installations. In downflow alcove installations, the grille and frame assembly may be mounted directly to the top of the furnace. In closet installations, a wall mount grille is available for attachment to a door or wall.

Optional Automatic Furnace Damper (901083)

Furnace may be equipped with the optional automatic damper when a packaged air conditioner is installed and connected to the warm air duct system. This damper (not required) prevents cooled air from discharging through the furnace cabinet, causing excessive cooling of the immediate area. Refer to the instructions supplied with the damper for details.

Duct Connectors for Downflow Systems

Duct connectors are recommended for heated air distribution in under-the-floor duct systems. With this system, furnaces may be installed on combustible flooring without a separate sub-base. The furnace rear mounting plate (Figure 8, page 10) supplied with the duct connectors is recommended for use with this type of installation.

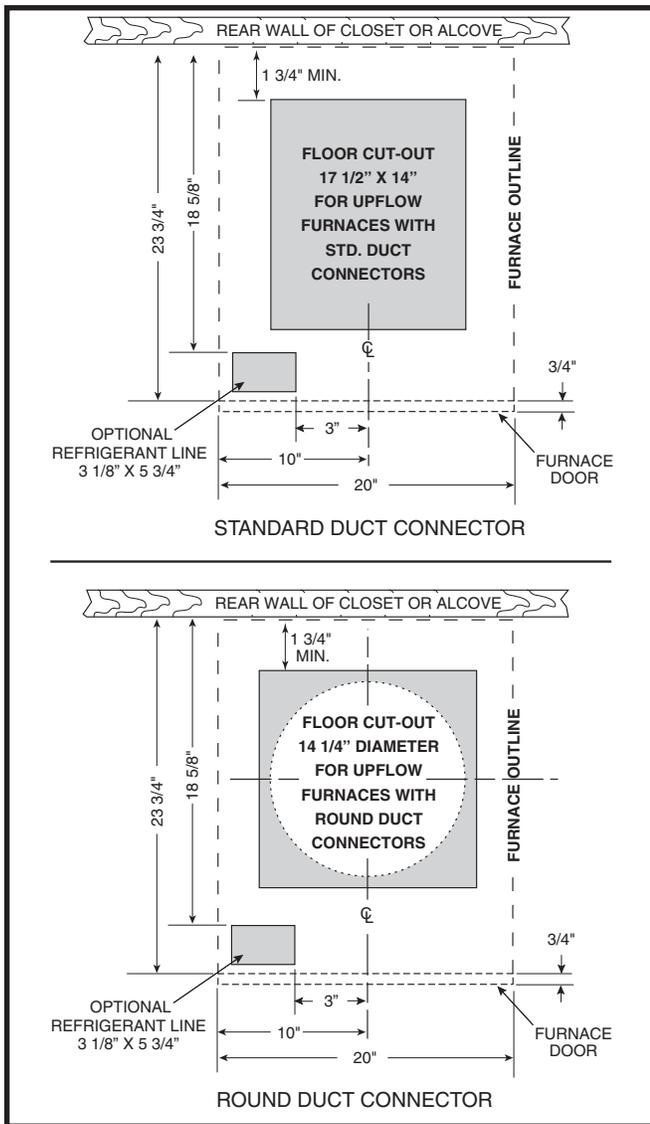


Figure 5. Cut-Out Dimensions for Upflow Furnaces

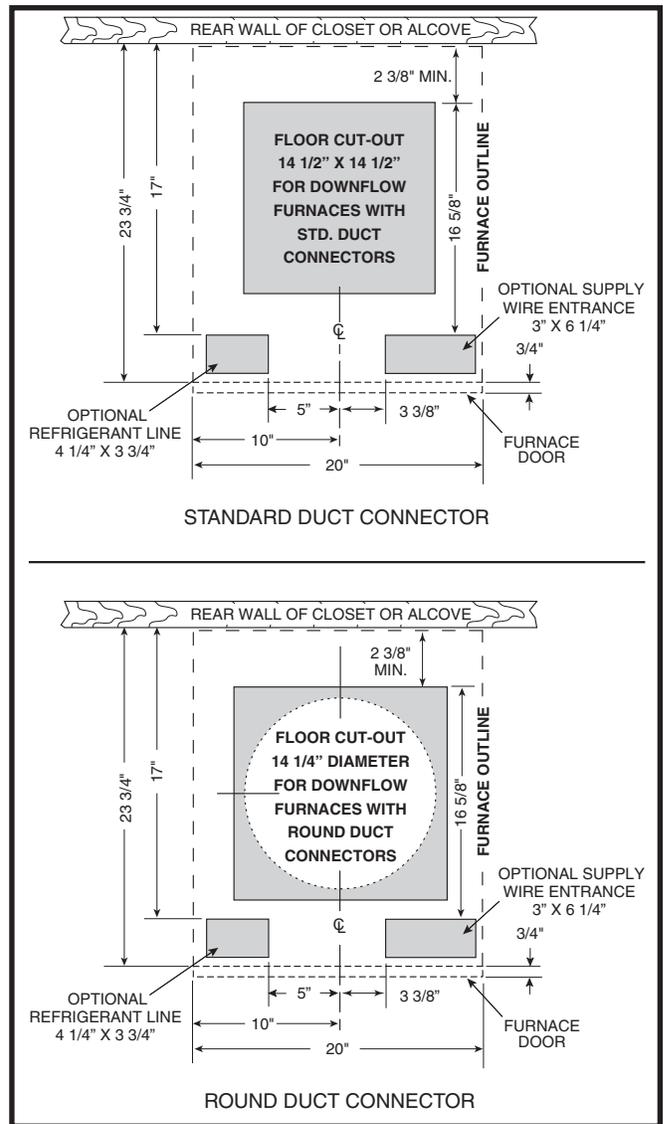


Figure 6. Cut-Out Dimensions for Downflow Furnaces

Locating & Cutting Floor Openings

Floor cut-outs must be carefully located to avoid misalignment of the furnace and air duct. Standard and round cutouts for upflow furnaces are shown in Figure 5. Figure 6 displays the cutouts for downflow furnaces.

1. Measure and mark the centerline of the cutout. Provide minimum clearances at rear and right side walls of closet or alcove for installation of furnace and wiring.
2. Using the centerline as a starting point, draw the rest of the duct cut-out to the dimensions shown in Figures 5 or 6. **NOTE:** Additional provisions may be necessary for optional air conditioning or heat pump if refrigerant lines are installed elsewhere than at the front of the furnace. The refrigerant and entrance supply opening dimensions may be adjusted $\pm 1/2$ ".
3. Cut out the floor opening $1/16$ " larger than the actual cutout drawn. This will allow some clearance when installing the duct connector.

4. Measure from the top of the floor down to the top of the supply air duct to obtain the depth of the floor cavity. **NOTE:** The depth of the floor cavity shown as "X" in Figure 7 will determine the correct duct connector.
5. Determine which duct connector to use from Table 2 (page 10).

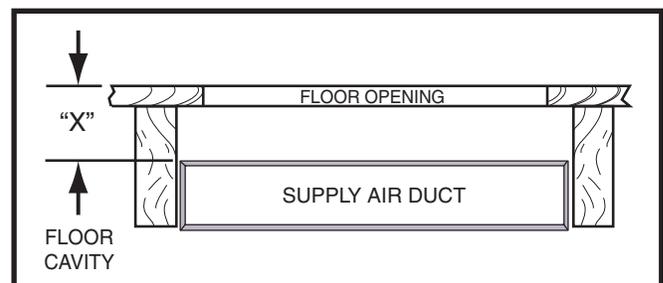


Figure 7. Floor Cavity

If Floor Cavity "X" is:	Duct Connector Type & Part Number	
	Standard Duct	Screw Down
7/8" / (22)	901987A	904008
2" / (51)	901988A	904009
4-1/4" / (108)	901989A	904010
6-1/4" / (159)	901990A	904011
8-1/4" / (210)	901991A	904012
10-1/4" / (260)	901992A	904013
12-1/4" / (311)	901993A	904014

NOTE: Dimensions shown as Inches / (Millimeter)

Table 2. Duct Connector Sizes

Standard Duct Connector Installation

The standard duct connector is designed for use on ducts 12" in width. **NOTE:** Ducts narrower than 12" may not allow sufficient clearances for this type of installation. See Narrow Duct Connector section.

1. Center the duct connector in the floor opening with bottom tabs resting on top of the supply air duct.
2. Mark the cut-out area on the supply air duct by tracing around the connector tabs (Figure 8) of the duct connector.
3. Remove the duct connector and cut out the marked area of the supply air duct 1/4" larger the actual cutout drawn.
4. Install the duct connector back in the floor opening with the bottom tabs extending into the supply air duct.
5. Install the mounting plate (Figure 8) under the back side of the duct connector. Align the screw holes in both components.
6. Secure the duct connector and the mounting plate to the wood floor with appropriate size screws.
7. Bend the connector tabs on the bottom of the duct connector upwards and as tight as possible against the supply air duct.

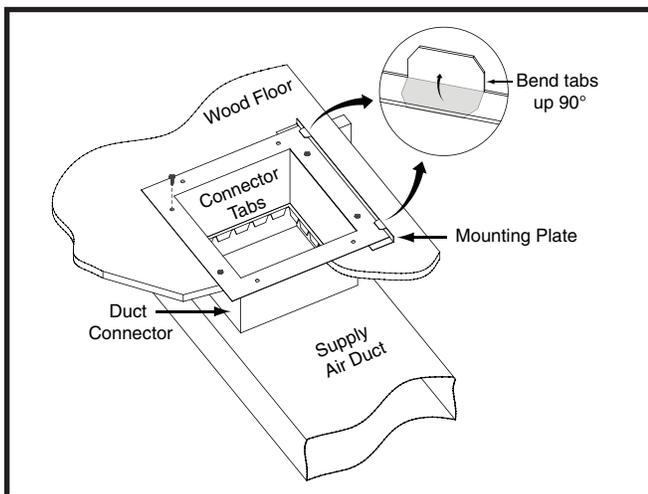


Figure 8. Standard Duct Connector Installed

8. Bend both tabs on the mounting plate up 90° as shown in Figure 9.
9. Seal all connections with industrial grade sealing tape or liquid sealant.

NOTE: Requirements for sealing ductwork vary from region to region. Consult with local codes for requirements specific to your area.

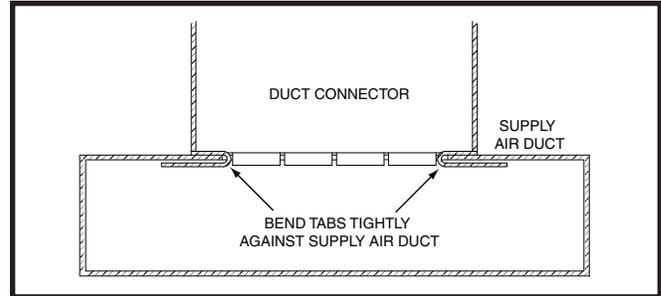


Figure 9. Duct Connector Tabs

Narrow Duct Connectors

This attachment method should be used if there is insufficient clearance to bend the tabs on a standard 12" duct connector.

1. Score and cut the top of the supply air duct as indicated in Option 1 or Option 2 (Figure 10). With Option 1 choice, cut out the metal from the shaded area.
2. Fold the two flaps (Options 1 or 2) up to form the opening for the duct connector.
3. Install the duct connector with the bottom tabs extending into the supply air duct.
4. Bend the tabs on the bottom of the duct connector upwards and as tight as possible against the supply air duct (Figure 11, page 11).
5. Form the flaps (Options 1 or 2) up against the duct connector as tight as possible.
6. Secure the duct connector flaps to the supply air duct with staples (3 minimum) or if a 2x block/joist is not provided, use sheet metal screws (2 minimum). **NOTE:** The duct connector tabs may be attached to the air duct with sheet metal screws or other suitable fasteners as long as the duct connector and the air duct are securely attached.

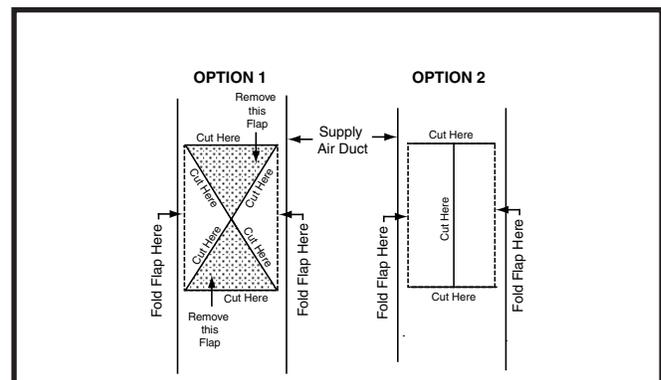


Figure 10. Narrow Air Duct Openings

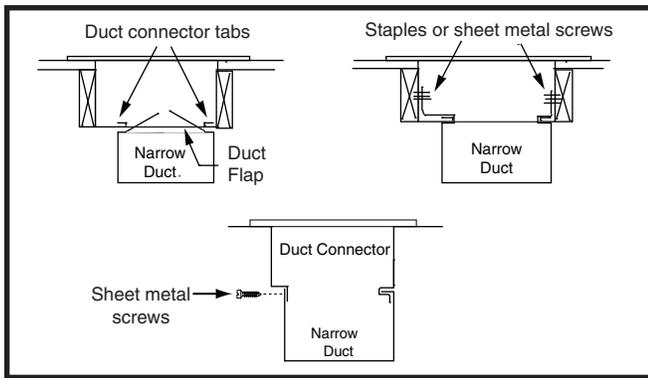


Figure 11. Narrow Ducts

7. Seal all connections with industrial grade sealing tape or liquid sealant.

NOTE: Requirements for sealing ductwork vary from region to region. Consult with local codes for requirements specific to your area.

Round Duct Connector Installation

The 14" round duct connector is designed to connect directly to a 14" flexible duct. **NOTE:** Flexible ducts must have a minimum temperature rating of 200° F and meet all applicable codes and standards.

1. Apply a bead of caulking, mastic, or other approved sealant around bottom side of connector.
2. Install and center the duct connector in the floor opening.
3. Install the mounting plate under the back side of the duct connector. See Figure 12. **NOTE:** Align the screw holes in both components.
4. Secure the duct connector and the mounting plate to the wood floor with appropriate size screws.
5. Connect the round supply duct to the underside of the duct connector and secure them with field supplied sheet metal screws.
6. Seal all connections with industrial grade sealing tape or liquid sealant.

NOTE: Requirements for sealing ductwork vary from region to region. Consult with local codes for requirements specific to your area.

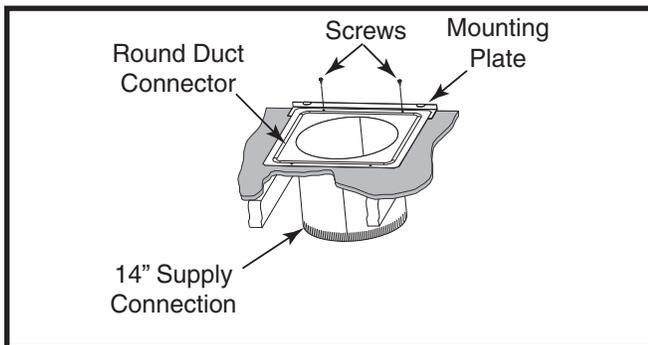


Figure 12. Round Duct Connector Installed

Alcove Installation

1. Cut alcove rough openings to minimum dimensions shown in Figure 13 (page 12).
2. Attach frame assembly with four fasteners (provided or equivalent) into pre-punched holes on top of furnace. See Figure 2 (page 7). **NOTE:** If additional securing is required, attach each side of frame assembly to alcove opening using holes provided.
3. Attach return air grille to frame assembly by hooking grille over flange on top of frame and into channel on bottom.

Closet Installation

For proper air circulation, closet installations require a return air grill installed in the door or a partially louvered door across the opening. For clearances 6" or greater, the closet must have an open free area of 235 in² minimum. For special clearances between 1" - 5", requirements are a louvered door with a minimum of 250 in² (1613 cm²) free area. A fully louvered closet door is strongly recommended for both installation types. For closet installations, the return air grille mounting frame is not used since the furnace is located inside the closet. For examples of both types of installations, see Figure 14 (page 12).

1. Cut return air opening in desired position in door or wall, preferably above top of furnace. Refer to Table 1 for return air opening requirements.
2. Insert four fasteners, securing grille to door or wall.

Downflow Furnaces

For typical unducted return air downflow applications, an air-conditioner or heat-pump coil can be installed by mounting the coil directly on top of the furnace without adding sheet metal cavities or cutting and trimming wood panels. Unducted return air systems may be used for closet or alcove installations.

The steps below describe installation procedures for an under-the-floor supply duct system with a ducted or unducted return air system. Duct connectors are recommended for this application. See Table 2 (page 10).

1. Route 240V supply circuit(s) and 24V wiring to closet or alcove. See Figure 21 (page 18) for locations.
2. Remove refrigerant line knockouts in furnace only when installing indoor coil of an air conditioner or heat pump system, or for hook-up of a VentilAire accessory when the furnace is used in the upflow position. Refer to instructions supplied with accessory equipment.
3. Remove unit front door and slide back until bottom slots in rear of unit engage with both tabs of optional rear mounting plate. If mounting plate is not used, an equivalent method of securing the rear of the unit may be used as long as it prevents displacement during transport if used in a manufactured home.

NOTE: The furnace does not need to be positioned against the rear mounting plate. The tabs will engage into the slots and allow approximately 1/2" of furnace adjustment front to back and side to side.

- Secure front of unit with one or more fasteners at mounting hole(s) provided or at tie-down tab. See Figure 21 (page 18).
- See Electrical Wiring section (page 13) to complete furnace installation.

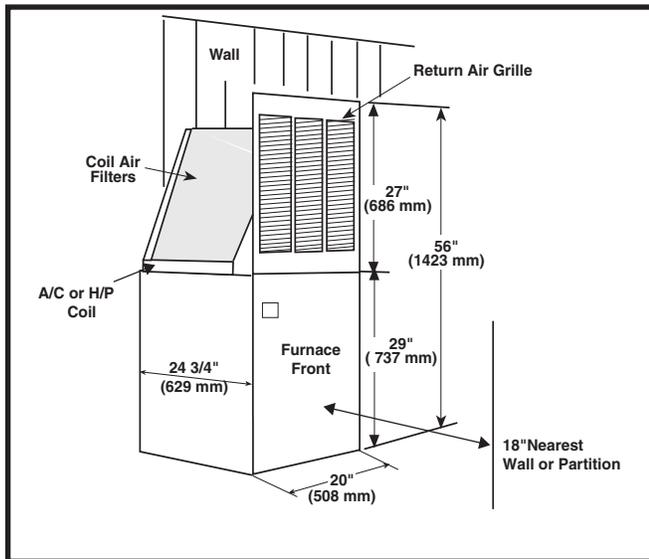
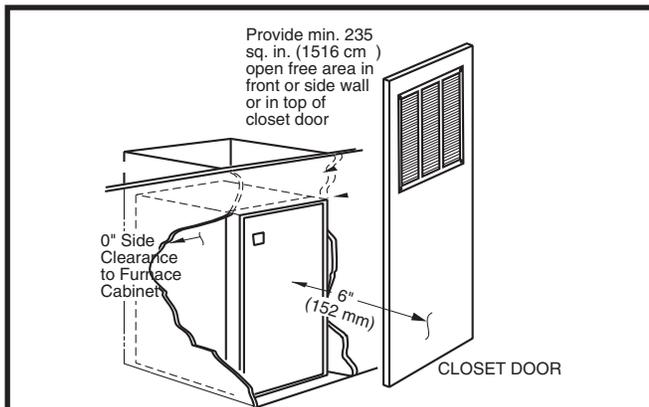


Figure 13. Alcove Installation



Standard Closet Installation

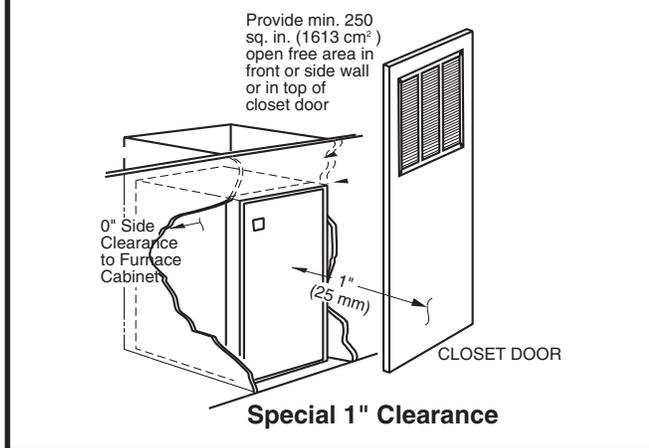


Figure 14. Closet Installation

Upflow Furnaces

The following steps describe installation instructions for an overhead supply duct system with a return air system that can be either over the floor (unducted) or through the floor (ducted).

NOTE: The 2 Wire Relay Control is NOT recommended for upflow applications, instead, the AC/HP Relay Control (4-7 wire) should be used when converting some models to accept an air conditioner. Refer to the instructions supplied with the Relay Control for further details.

NOTE: Remove refrigerant line knockouts in furnace only when installing indoor coil from an air conditioner or heat pump system.

Refer to instructions supplied with accessory equipment.

Over-the-Floor Return Air System (Non-Ducted)

- If floor underneath furnace is made of combustible material, locate a pan fabricated of non-combustible material with 1" upturned flanges under furnace return air opening (see Figure 15).
- Use optional upflow stand with filters or construct a suitably braced mounting platform in closet. See Figure 16 (page 13).
- Route 240V supply circuit(s) and 24V wiring to closet. See Figure 21 (page 18) for appropriate locations.
- Position optional coil cabinet onto upflow stand or mounting platform and secure with three or more fasteners.
- Position furnace in upflow mode onto coil cabinet and secure with two or more fasteners.
- Use optional upflow duct connector or field supplied connector to attach furnace to overhead supply duct. See Figure 16.
- Install return air grille in closet preferably at same level as upflow stand or below mounting platform. See Figure 15.

NOTE: Be sure to provide an adequate free return air area as described in the Closed-Off Spaces section (page 7).

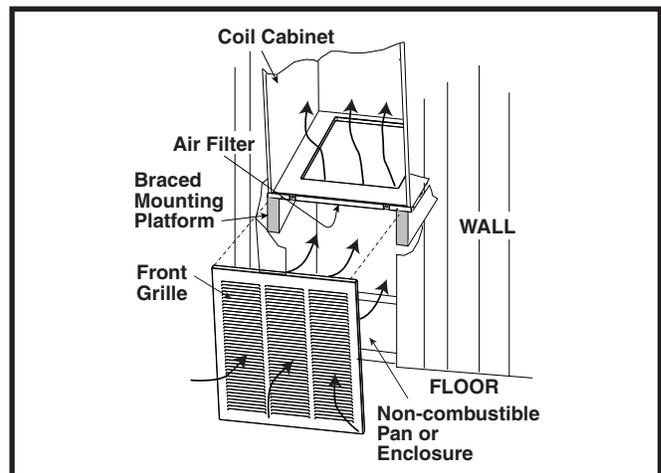


Figure 15. Over-the-Floor Return Air System

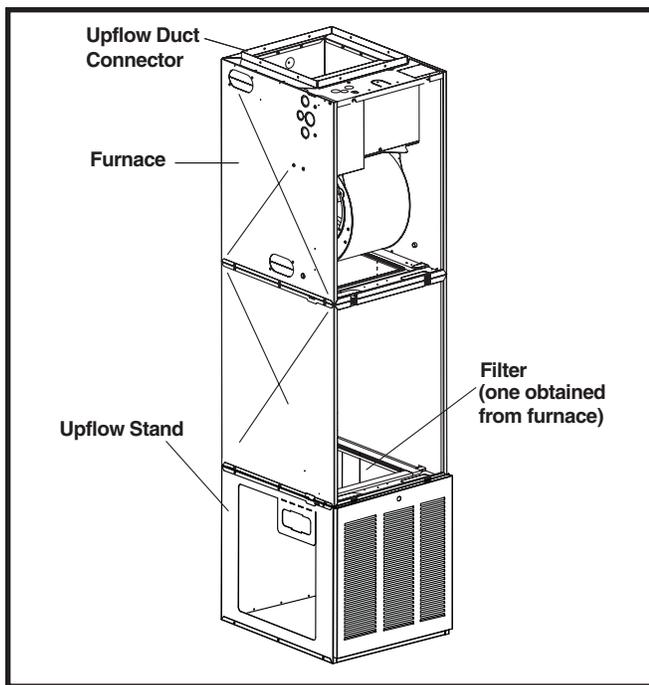


Figure 16. Over-the-Floor Return Air System with Upflow Stand

Through-the-Floor Return Air System (Ducted)

1. Prepare Floor Opening(s):
 - a. Mark floor openings as shown in Figure 5 (page 9). Provide minimum clearances at rear and left side walls of closet for installation of furnace and wiring.
 - b. Cut floor opening on outside edge of marked line so that opening is slightly larger than area marked.
 - c. Additional provisions may be necessary for optional air conditioning if refrigerant lines are installed other than at the front of the furnace.
2. If return air duct is made of combustible material, locate a pan fabricated of non-combustible material with 1" upturned flanges under furnace return air opening.
3. Route 240V supply circuit(s) and 24V wiring to closet. See Figure 21 (page 18) for appropriate locations.
4. Position optional coil cabinet over floor cutout and secure with three or more fasteners.
5. Position furnace onto coil cabinet and secure with two or more fasteners.
6. Use optional upflow duct connector or field supplied connector to attach furnace to overhead supply duct. See Figure 16.

ELECTRICAL WIRING

⚠ WARNING:

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury 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 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).

Line Voltage Wiring

IMPORTANT NOTE: Proper line voltage polarity must be maintained for the control system to operate correctly. Verify the incoming neutral line is connected to the white wire and the incoming HOT line is connected to the black wire. The furnace will not operate unless the polarity and ground are properly connected.

⚠ IMPORTANT:

Circuit breakers installed in this unit provide short-circuit protection of the internal wiring and serve as a disconnect. The circuit breakers DO NOT provide over-current protection of the supply wiring and may be sized larger than the branch circuit protection. Overcurrent protection of the supply wiring is provided by the breaker in the distribution panel and must be sized as shown in Table 7 (page 20).

It is recommended that the line voltage (240 VAC) to the furnace be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the furnace. See Table 7 (page 20) for minimum circuit ampacity and maximum over-current protection. See unit wiring diagrams (Figures 23 - 26, pages 21 - 24) for wiring details. Electrical components are shown in Figure 20 (page 17). Supply circuit requirements are listed at the top of page 14:

- -010 model is factory-wired for single-branch supply circuit only.
- -012 models are factory-wired for single-branch supply circuit (single-circuit kit factory installed). Dual-branch circuit can be used by removing factory-installed single-circuit kit (see Figure 17).
- -015, -017, -020 and -023 models are factory-wired for dual-branch supply circuit. Single-branch circuit can be used by installing optional single-circuit kit.

Connecting Supply Service Wires

Power entrance for all models may be through the right side or through the bottom of the unit.

1. Remove right-hand control panel (when viewing in downflow position).
2. Locate power supply knockouts in side of unit and in bottom of unit. Remove appropriate plug(s) or knockout opening applicable to selected wire size(s).

⚠ WARNING:

To avoid personal injury or property damage, make certain that the motor leads cannot come into contact with non-insulated metal components of the unit.

3. Install listed cable connector(s) in opening(s). If metal-sheathed conduit is used for incoming power line(s), provide an approved metal clamp on conduit and secure it in entrance knockout.
4. Insert supply service wire(s) through cable connector(s) and connect wires to circuit breakers (Figures 17 & 18). **NOTE:** To install single-circuit kit, perform step 5. If single-circuit kit installation is not needed, go to step 6.

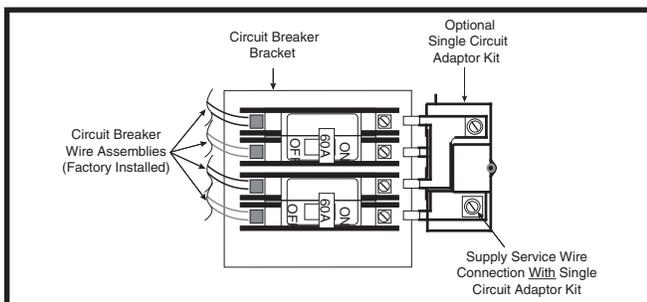


Figure 17. Optional Single Circuit Adaptor Kit

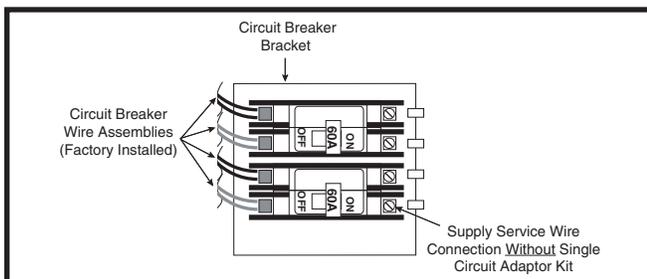


Figure 18. Installation of Supply Service Wires

5. To install optional single-circuit kit:
 - a. Loosen lugs at supply side of circuit breakers.
 - b. Remove cover from single-circuit kit (if supplied).
 - c. Insert metal buss bars of kit into lugs of circuit breaker.
 - d. Tighten lugs securely (45 in.-lbs. recommended).
6. Connect service ground wire(s) to grounding lug(s) provided. One ground is required for each supply circuit used. See Figure 20 (page 17).

Grounding

⚠ WARNING:

To minimize personal injury, the furnace cabinet must have an uninterrupted or unbroken electrical ground. The controls used in this furnace require an earth ground to operate properly. Acceptable methods include electrical wire or conduit approved for ground service. Do not use gas piping as an electrical ground!

Thermostat / Low Voltage Connections

- The furnace is designed to be controlled by a 24 VAC thermostat. The thermostat's wiring must comply with the current provisions of the NEC (ANSI/NFPA 70) and with applicable local codes having jurisdiction.
- 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.

Selecting Blower Speed

The E3EB model is equipped with a 4-speed PSC motor which can be upgraded to a multi-speed high efficiency X-13 motor using kit 904619. It is equipped with a multi-speed blower, blower relay, and cabinet insulation kit for air conditioner hookup. See Table 6 (page 19) for cooling and heat pump availability with factory installed blower.

⚠ IMPORTANT:

If a relay box is installed, blower speeds for heating and cooling are set inside the relay box. The blower speed inside the furnace control box must be set to low or medium-low. Never change to a heating speed lower than that shown in Table 3 (page 15). See instructions supplied with relay box.

See Table 3 for the lowest speed approved for the heating output of the unit. Since the blower leads connect to the control box, blower speed selection is through use of the

Plug/Receptacle Position	Pin1	Pin2	Pin3	Pin4	Pin5
4 Speed Blower	Low	Med-LO	Med-Hi	High	-
Control Box Blower Lead	Red	Yellow	Blue	Black	-

Table 3. Furnace Blower Speed Data

proper color-coded blower lead located inside the control box. The speed(s) set by the factory may be different from that shown on the wiring diagrams. See the unit control box for factory set blower speed(s).

Changing Blower Speed

The selected heating blower lead is attached to terminal 6 of the blower relay. The selected cooling blower lead is attached to terminal 4 of the blower relay.

- For New Heating Speed: Remove heating blower lead from terminal 6 of the blower relay. Choose desired speed and install new blower lead on terminal 6 of the blower relay.
- For New Cooling Speed: Remove cooling blower lead from terminal 4 of the blower relay. Install new blower lead on terminal 4 of the blower relay.
- Same Speed, Heating & A/C: Use white jumper wire supplied with unit and jumper between terminals 5 & 2 on blower relay. See Table 4 for blower performance data.

4-Ton Blower with Coil and Coil and Filters, @ 0.3" ESP		
Pin No.	Speed	CFM
#1	Low	880
#2	Med.-Low	1,170
#3	Med.-High	1,310
#4	High	1,460
5-Ton Blower, with Coil and Coil Filters, @ 0.3" ESP		
Pin No.	Speed	CFM
#1	Low	990
#2	Med.-Low	1,320
#3	Med.-High	1,620
#4	High	1,790
Multi-Speed, X13, Blower, with Coil and Filters, @ 0.3" ESP		
Pin No.	Speed	CFM
#1	Low	880
#2	Med.-Low	1,000
#3	Med	1,170
#4	Med.-High	1,260
#5	High	1,460

Table 4. Blower Performance

Blower Installation

1. Turn off all electrical supply circuits to the furnace at the main service panel.
2. Remove furnace front door and switch furnace circuit breaker(s) to OFF.
3. Disconnect the motor plug from the control panel receptacle.
4. Remove one screw from left side of blower and three screws from right side of blower. Slide blower forward to remove.
5. Install new blower. **NOTE:** Make sure the side flanges engage under side mounting tabs. Three tabs on one side and one on the other. The long tab is in the rear.
6. Replace screws removed from blower in step 4.
7. Connect the motor plug to the control panel receptacle.
8. Switch circuit breaker(s) to ON.
9. Reinstall furnace front door and turn on electrical supply circuits to the furnace.

Installing Control Circuit Wiring

NOTE: Installation of a five-wire thermostat circuit is recommended to for future addition of a heat/cool thermostat. See Figure 19 (page 16) for various E3EB thermostat connections.

1. Install the 24V control-circuit cable through plastic bushing at either side of furnace.
 - Units without a relay box: connect wires to furnace at blower plug pigtails (see wiring diagrams). Secure all connections with wire nuts.
 - Units with relay box installed: make wiring connections at relay box low-voltage terminal board. See relay box installation instructions.
2. Route control circuit wiring to wall thermostat and outdoor section, if installed. (See relay box installation instructions if applicable.)
3. Set anticipator per Table 5 or per the marking on the unit.

Furnace Model	T-Stat Anticipator Setting
010, 012	0.2
015, 017, 020, 023	0.4

Table 5. Anticipator Settings

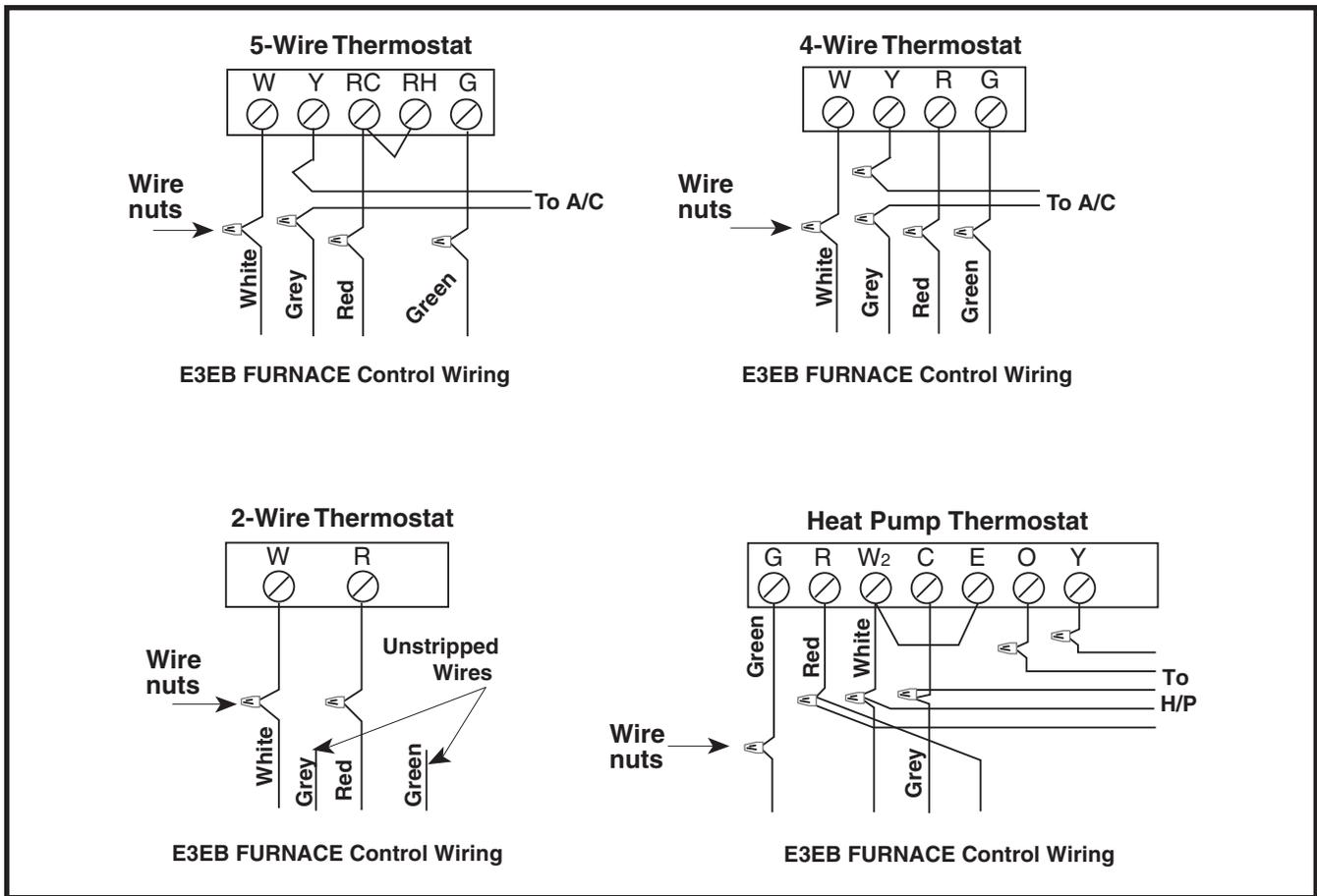


Figure 19. E3EB Thermostat Connection

START-UP & ADJUSTMENTS

Pre-Start Check List

- ✓ Verify the polarity of the connections are correct, the line voltage power leads are securely connected and the furnace is properly grounded. Refer to the appropriate wiring diagram.
- ✓ Verify the thermostat wires are securely connected to the correct leads on the terminal strip of the circuit board.
- ✓ Check blower motor and relay box connectors for proper connection.

Start-up Procedures

1. Reinstall control box cover(s).
2. Switch circuit breaker(s) to the ON position.
3. Replace outer furnace door.
4. Check all duct connections and tape for air leakage.

FIGURES & TABLES

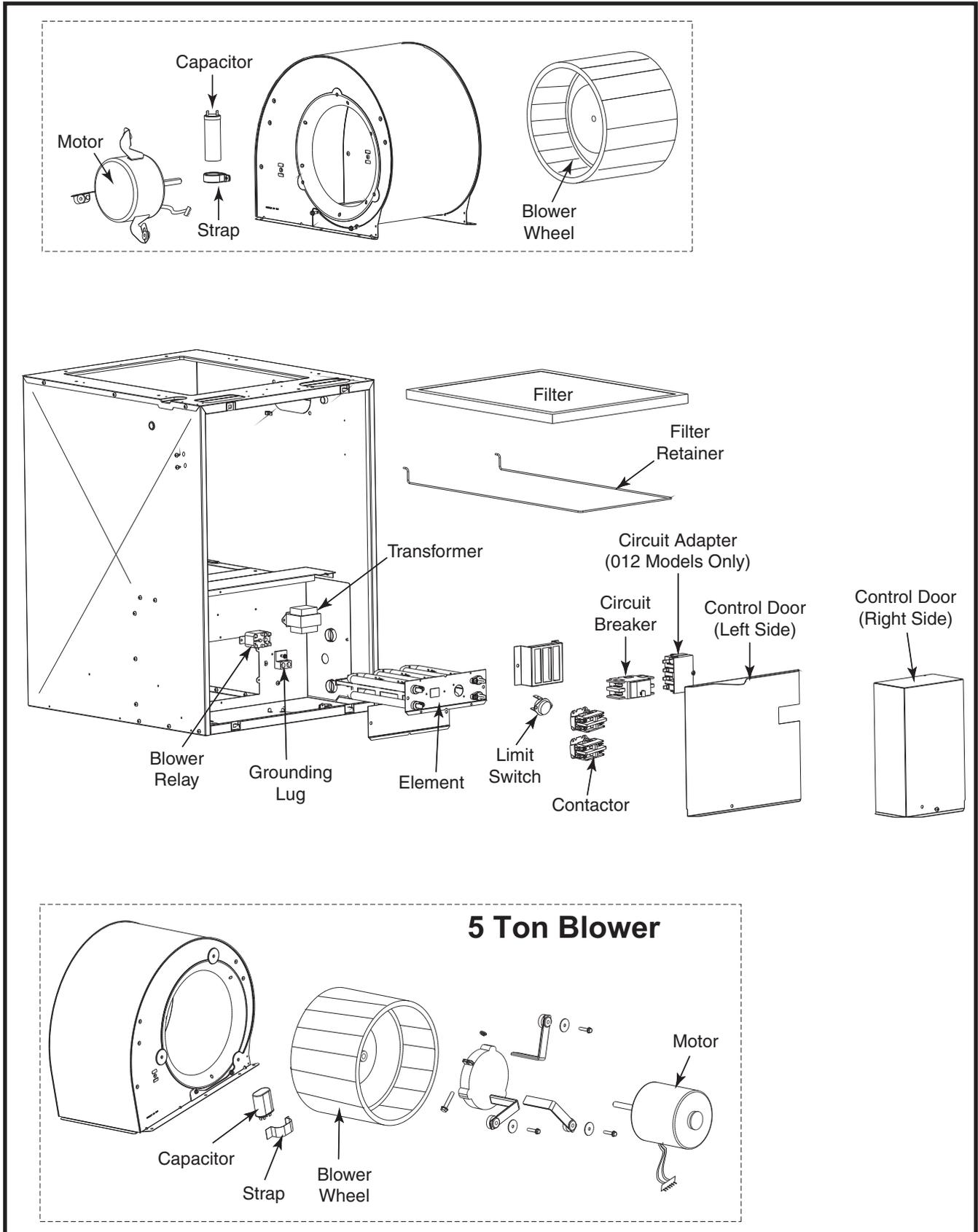


Figure 20. E3 Furnace Components

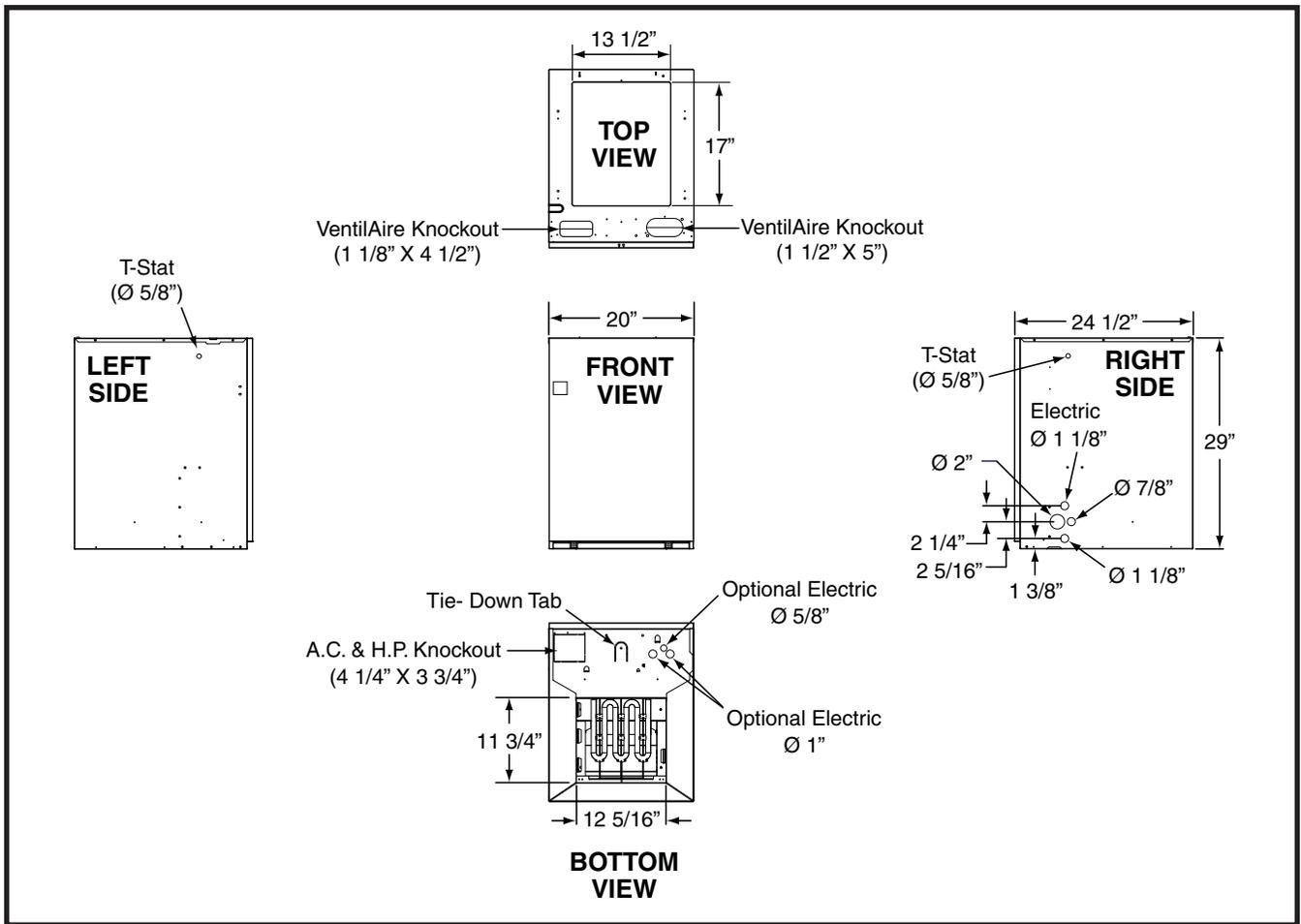


Figure 21. E3 Furnace Physical Dimensions

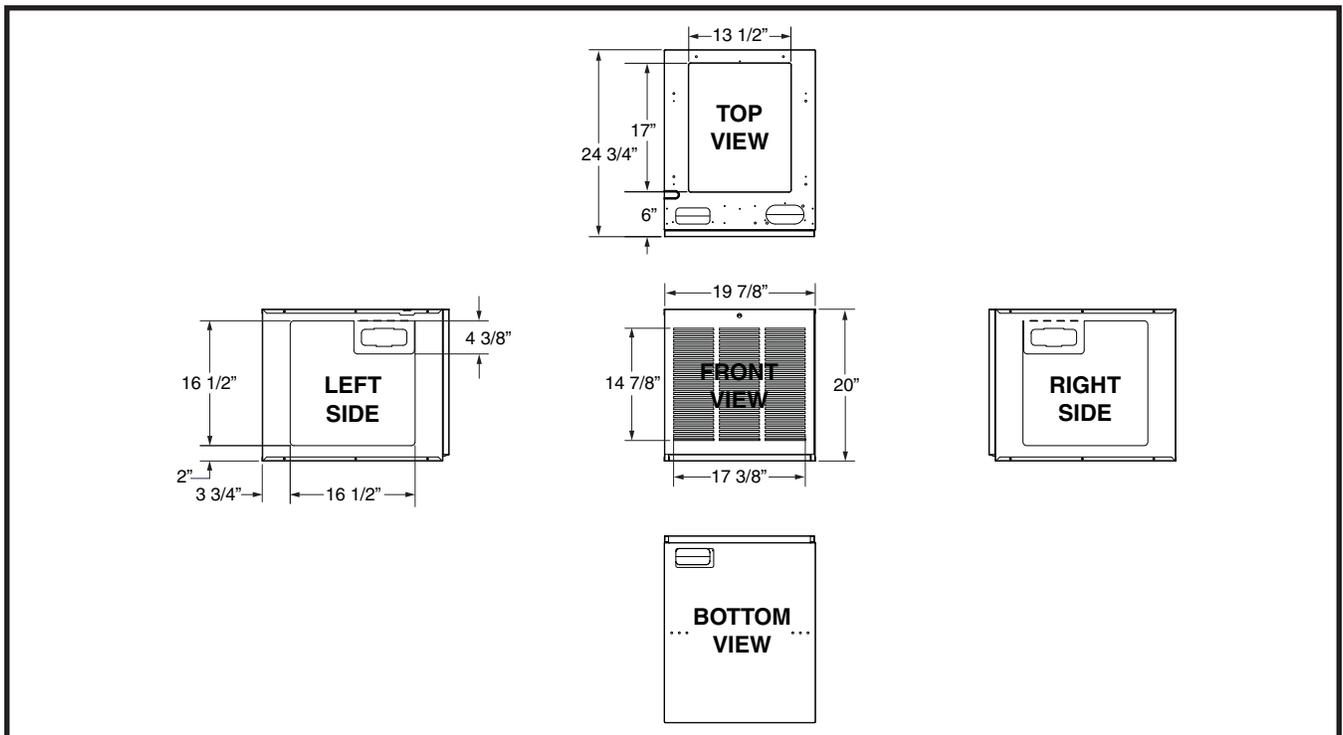


Figure 22. E3 Furnace Upflow Stand Dimensions

ELECTRICAL INFORMATION

	Furnace Models E3EB-						
	010H	012H	015H	017H	020H	023H	023H 5-Ton
Rated Heating Output, Btuh (see note 1)	35,000	41,000	53,000	57,000	70,000	75,000	75,000
Watts (Total kw, Heating Elements & Blower)	10.4	12.0	15.4	16.6	20.4	22.0	22.0
Supply Voltage	240 Volts/60Hz/1-Phase						
Heating Elements, No. (Total kw)	2 (10.0)	2 (11.6)	3 (15.0)	3 (16.2)	4 (20.0)	4 (21.6)	4 (21.6)
Blower Wheel Size	10.5" Dia, 8" W	10.5" Dia, 8" W	10.5" Dia, 8" W	10.5" Dia, 8" W	10.5" Dia, 8" W	10.5" Dia, 8" W	11" Dia., 8" W
Motor Speed, H.P. Rating, Amps	4 Speed, 1/3 HP, 2.9						4 Spd, 3/4HP, 3.8 Amps
Test ESP, in. w.c. Max	0.3						
Optional Cooling Available with factory installed blower	2.0 - 4.0 Ton (See Note 3)						2.0 - 5.0 Ton
Optional Heat Pump Available with factory installed blower	2.0 - 4.0 Ton						
Air Filter (Standard)	16" x 20" x 1" (nominal)						
Furnace Dimensions	Width-20" (508mm), Height-29" (737mm) (see note 2), Depth-24 1/2" (623mm)						

1. Heating output rated at listed voltage. For outputs at voltages other than 240V, multiply Btuh rating by the following factors: x 0.92 (230V), x 0.84 (220V), x 0.75 (208V).
2. Height is 56" with return air grille installed, 58" with coil cabinet and 72" with coil cabinet and upflow stand.
3. The factory installed blower for the EB models can be replaced with a multi-speed blower allowing the units to accept up to 5 tons of air conditioning.

Table 6. Unit Specifications

Model Number E3EB-	Supply Circuit	Total Amperes	Maximum Over-current Rating	Minimum Circuit Ampacity	Low Voltage Thermostat Wire Size
010H	Single	44.6	60	56	2-Wire system maximum wire lengths: 24 Ga. = 55' 22 Ga. = 90' 20 Ga. = 140' 18 Ga. = 225'
012H	Single	51.2	70	64	
	Dual "A"	27.1	40	34	
015H	Dual "B"	24.2	30	30	
	Single	65.4	90	82	
	Dual "A"	44.6	60	56	
017H	Dual "B"	20.8	30	26	4 or more wire systems maximum wire lengths: 24 Ga. = 25' 22 Ga. = 45' 20 Ga. = 70' 18 Ga. = 110'
	Single	70.4	90	88	
	Dual "A"	47.9	60	60	
020H	Dual "B"	22.5	30	28	
	Single	86.2	125	108	
	Dual "A"	44.6	60	56	
023H	Dual "B"	41.7	60	52	
	Single	93.8	125	117	
	Dual "A"	45.5	60	57	
	Dual "B"	48.0	60	60	

Model Number E3EX-	Supply Circuit	Total Amperes	Maximum Over-current Rating	Minimum Circuit Ampacity	Low Voltage Thermostat Wire Size
010	Single	47.7	60	57	2-Wire system maximum wire lengths: 24 Ga. = 55' 22 Ga. = 90' 20 Ga. = 140' 18 Ga. = 225'
012	Single	54.3	70	67	
	Dual "A"	30.2	40	35	
015	Dual "B"	24.2	30	30	
	Single	66.0	90	83	
	Dual "A"	46.0	60	57	
017	Dual "B"	20.0	30	25	4 or more wire systems maximum wire lengths: 24 Ga. = 25' 22 Ga. = 45' 20 Ga. = 70' 18 Ga. = 110'
	Single	71.5	90	89	
	Dual "A"	51.0	60	60	
020	Dual "B"	22.5	30	28	
	Single	86.0	125	109	
	Dual "A"	46.0	60	57	
	Dual "B"	40.0	60	50	

NOTE: Wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.

Table 7. E3 Electrical Specifications

WIRING DIAGRAM

WARNING

Switch circuit breakers to the "off" position before servicing the furnace.

Model: E3EB-010H

NOTES:

1. Supply wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.
2. Thermostat anticipator setting: 0.20 Amps
3. To change blower speed on units without a relay box installed refer to installation instructions
4. Refer to furnace and/or relay box installation instructions for thermostat connections.
5. If any wire in this unit is to be replaced it must be replaced with 105° C thermoplastic copper wire of the same gauge.
6. Not suitable for use on systems exceeding 120V to ground.
7. Refer to installation instructions for complete wiring diagram.
8. Heating and cooling may be wired on the same speed using either a relay box or the provided jumper wire.

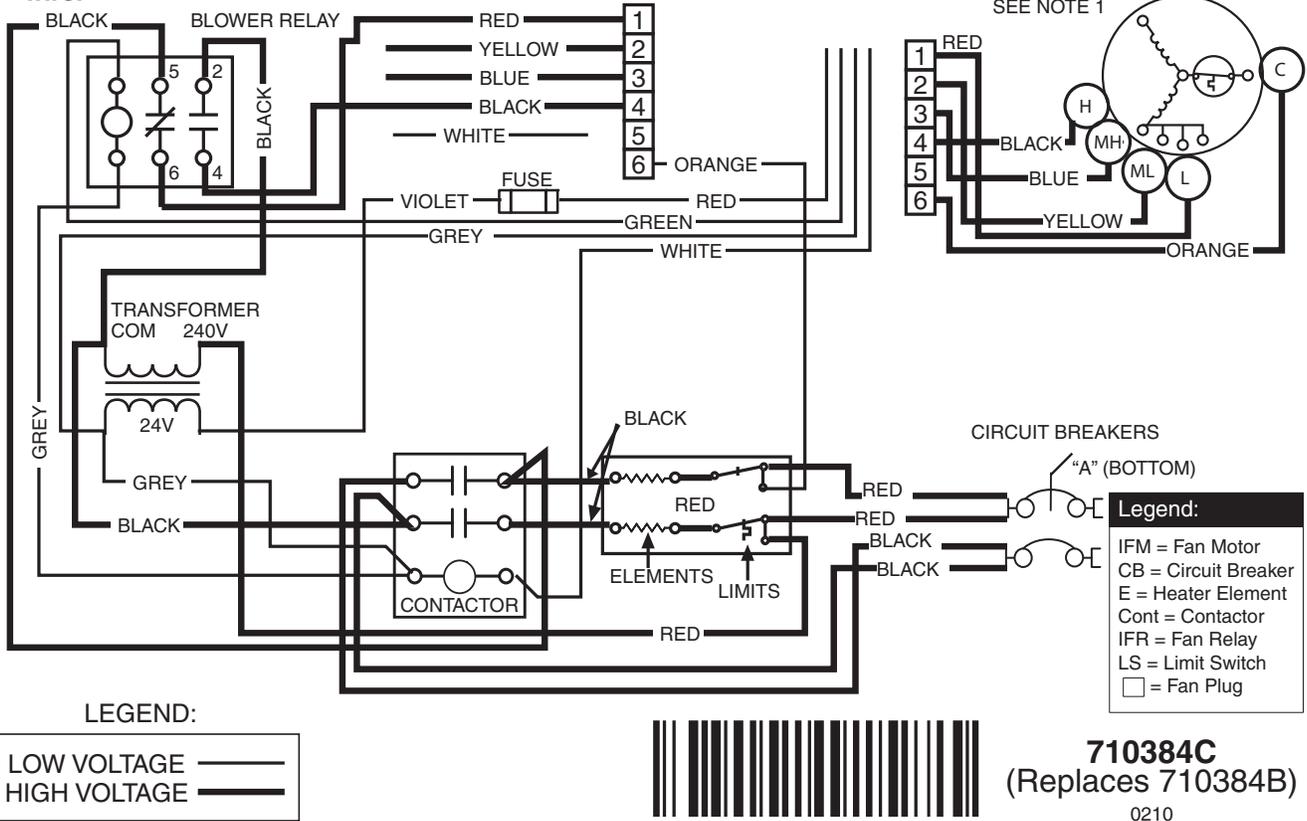


Figure 23. Wiring Diagram for E3EB 010H Furnaces

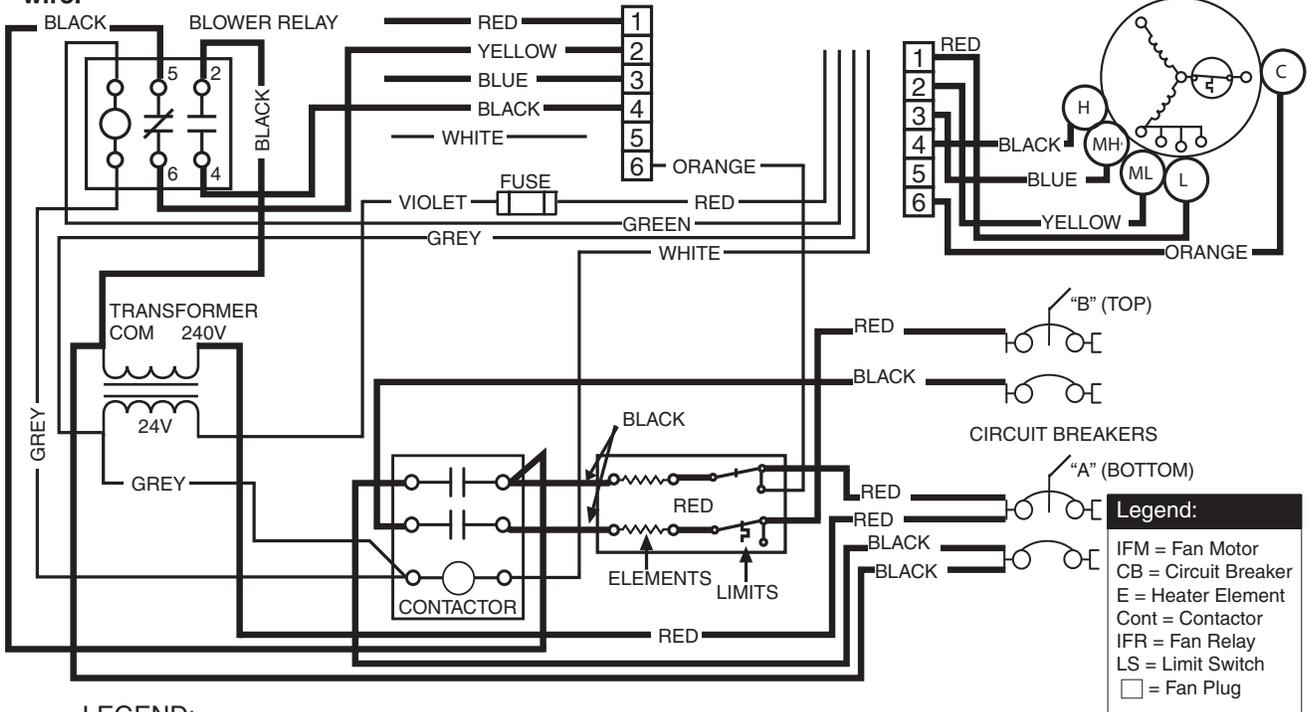
WIRING DIAGRAM

WARNING
Switch circuit breakers to the "off" position before servicing the furnace.

Models: E3EB-012H

NOTES:

1. Supply wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.
2. Thermostat anticipator setting: 0.20 Amps
3. To change blower speed on units without a relay box installed refer to installation instructions
4. Refer to furnace and/or relay box installation instructions for thermostat connections.
5. If any wire in this unit is to be replaced it must be replaced with 105° C thermoplastic copper wire of the same gauge.
6. Not suitable for use on systems exceeding 120V to ground.
7. Refer to installation instructions for complete wiring diagram.
8. Heating and cooling may be wired on the same speed using either a relay box or the provided jumper wire.



LEGEND:
LOW VOLTAGE ———
HIGH VOLTAGE ———



710385C
(Replaces 710385B)
0210

Figure 24. Wiring Diagram for E3EB 012H Furnaces

WIRING DIAGRAM

WARNING
Switch circuit breakers to the "off" position before servicing the furnace.

Models: E3EB-015H, 017H

NOTES:

1. Supply wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.
2. Thermostat anticipator setting: 0.40 Amps
3. To change blower speed on units without a relay box installed refer to installation instructions
4. Refer to furnace and/or relay box installation instructions for thermostat connections.
5. If any wire in this unit is to be replaced it must be replaced with 105° C thermoplastic copper wire of the same gauge.
6. Not suitable for use on systems exceeding 120V to ground.
7. Refer to installation instructions for complete wiring diagram.
8. Heating and cooling may be wired on the same speed using either a relay box or the provided jumper wire.

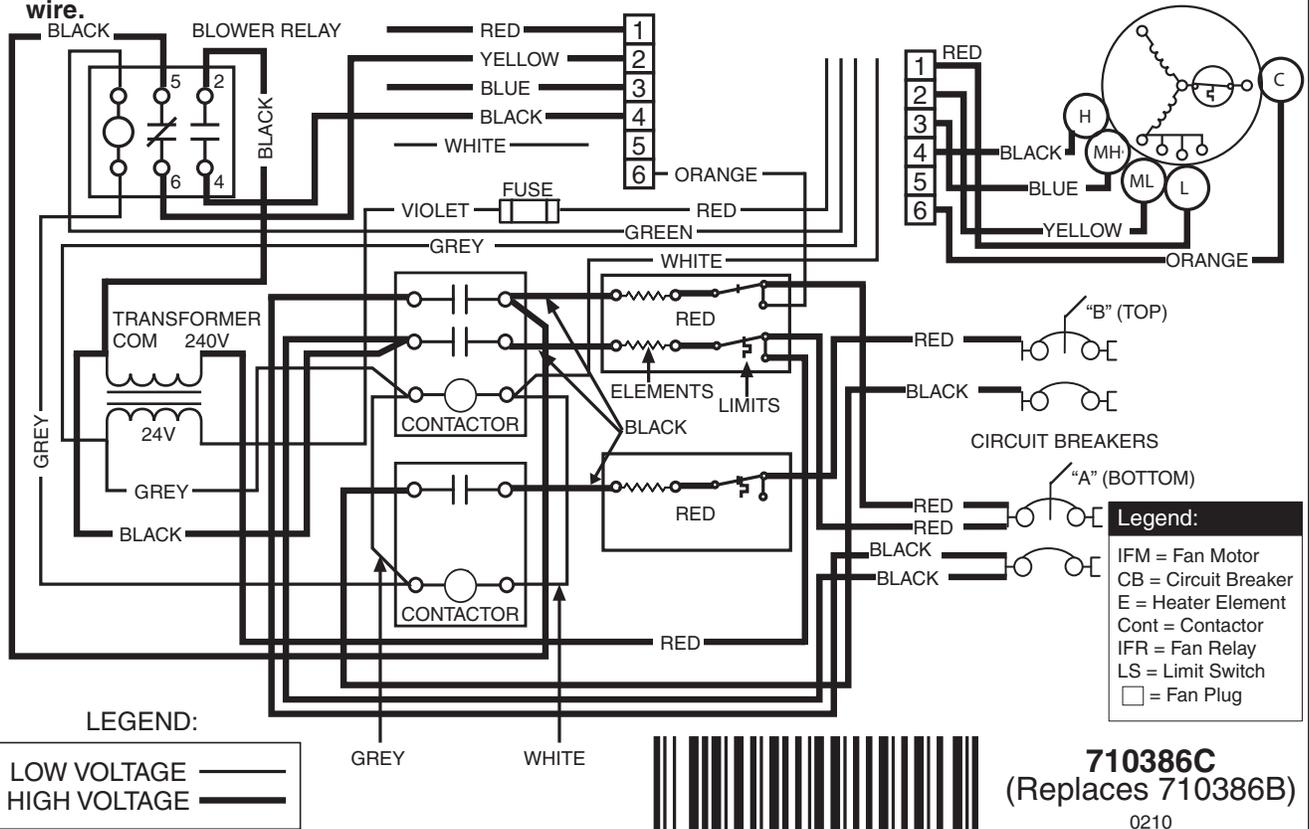


Figure 25. Wiring Diagram for E3EB 015H, E3EB 017H Furnaces

WIRING DIAGRAM

WARNING
Switch circuit breakers to the "off" position before servicing the furnace.

E3EB-020H, 023H, 023H-5 Ton; E2EB-015HBR

NOTES:

1. Supply wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.
2. Thermostat anticipator setting: 0.40 Amps
3. To change blower speed on units without a relay box installed refer to installation instructions
4. Refer to furnace and/or relay box installation instructions for thermostat connections.
5. If any wire in this unit is to be replaced it must be replaced with 105° C thermoplastic copper wire of the same gauge.
6. Not suitable for use on systems exceeding 120V to ground.
7. Refer to installation instructions for complete wiring diagram.
8. Heating and cooling may be wired on the same speed using either a relay box or the provided jumper wire.

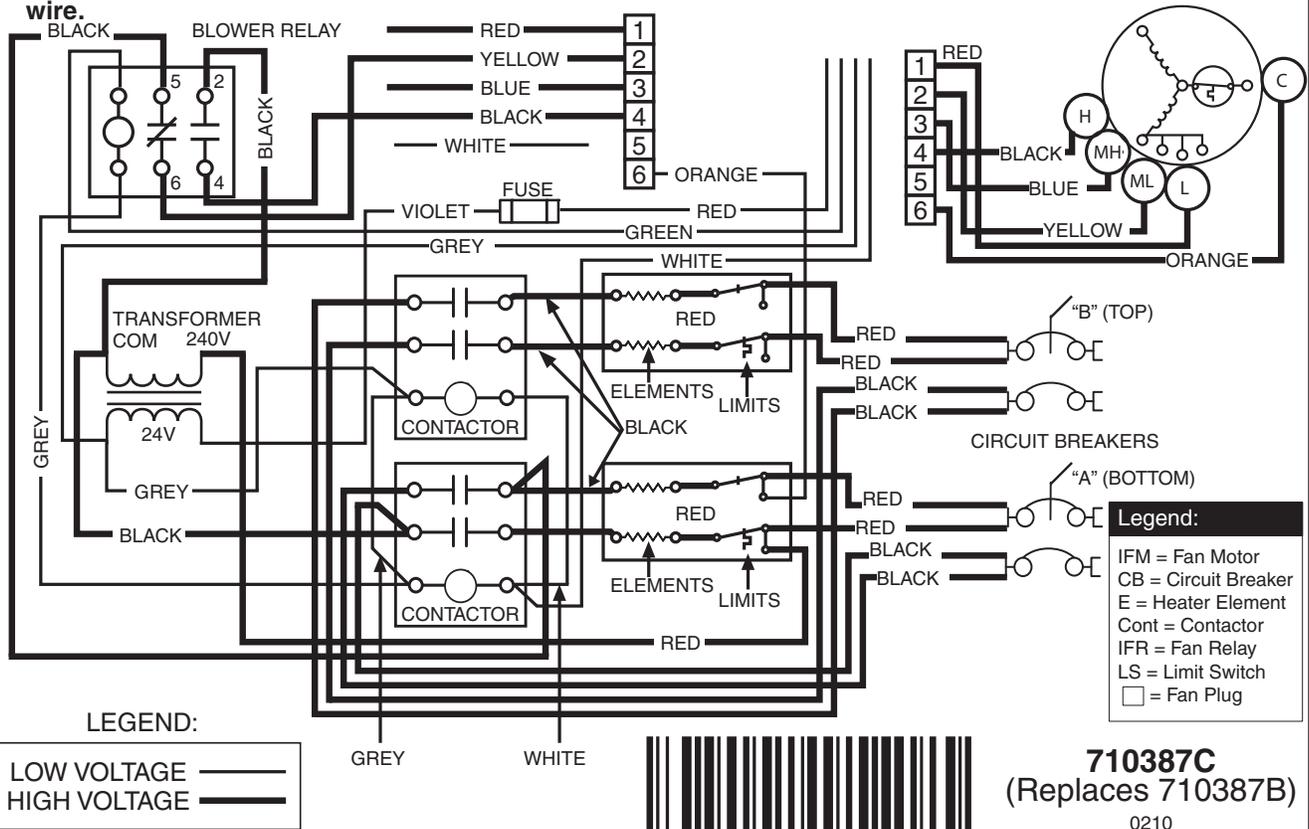


Figure 26. Wiring Diagram for E3EB 020H, 023H, & 023H - 5 Ton, E2EB-015HBR Furnaces

INSTALLATION / PERFORMANCE CHECK LIST

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, service, or maintenance of the furnace 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. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

INSTALLER NAME:

CITY:

STATE:

INSTALLATION ADDRESS:

CITY:

STATE:

UNIT MODEL #

UNIT SERIAL #

Minimum clearances per Table 1 (page 5)?	YES	NO
Has the owner's information been reviewed with the home-owner?	YES	NO
Has the literature package been left near the furnace?	YES	NO

ELECTRICAL SYSTEM:

Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Supply Voltage: _____ VOLTS		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the furnace grounded properly?	YES	NO
Is the heat anticipator setting correct?	YES	NO

COMBUSTION AIR & VENTING SYSTEM:

Is there adequate fresh air supply for ventilation?	YES	NO
Filter(s) secured in place?	YES	NO
Filter(s) clean?	YES	NO

! WARNING:

PROPOSITION 65 WARNING: This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.



Complies with H.U.D. Manufactured Home Construction & Safety Standards.

NORDYNE
COMPLETE COMFORT. GENUINE VALUE.



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708976B (Replaces 708976A)