

Downflow, Upflow Electric Furnaces

Owners Manual/Installation Instructions

E2EH-xxx HB Series

E2EB-xxx HB Series

(Air Conditioner/Heat Pump Air Handler)

IMPORTANT: Read this owner information to become familiar with the capabilities and use of your heating appliance. Keep this literature where you will 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 the appropriate NORDYNE distributor. A distributor service list is included with this appliance.

WARNING:

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage, or death. Refer to this manual. For assistance or additional information consult a qualified dealer or service agency. To avoid personal injury or property damage, ask a service technician to inspect the furnace and to replace any part of the control system which has been under water.

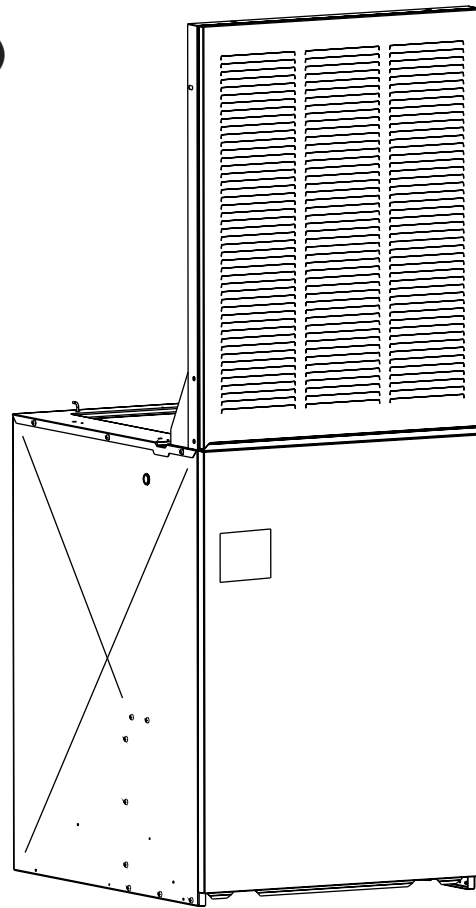
SECTION 1. OWNER INFORMATION

OPERATING INSTRUCTIONS

Before Operating System

Before operating your heating/cooling system (see Figure 1), make sure that:

- Control panel covers are closed.
- Blower and/or relay control plugs are plugged in.
- Fan switch is set to "AUTO" (E2EH units only).
- Circuit breakers are in "ON" position.



CAUTION:

No user serviceable parts inside control panel. **DO NOT OPEN.**

- All power supply switches for furnace and outside unit (if installed) are turned on.
- Furnace door is closed and properly latched.

Refer to the owner's manual supplied with the optional heat pump or air conditioner for further information.

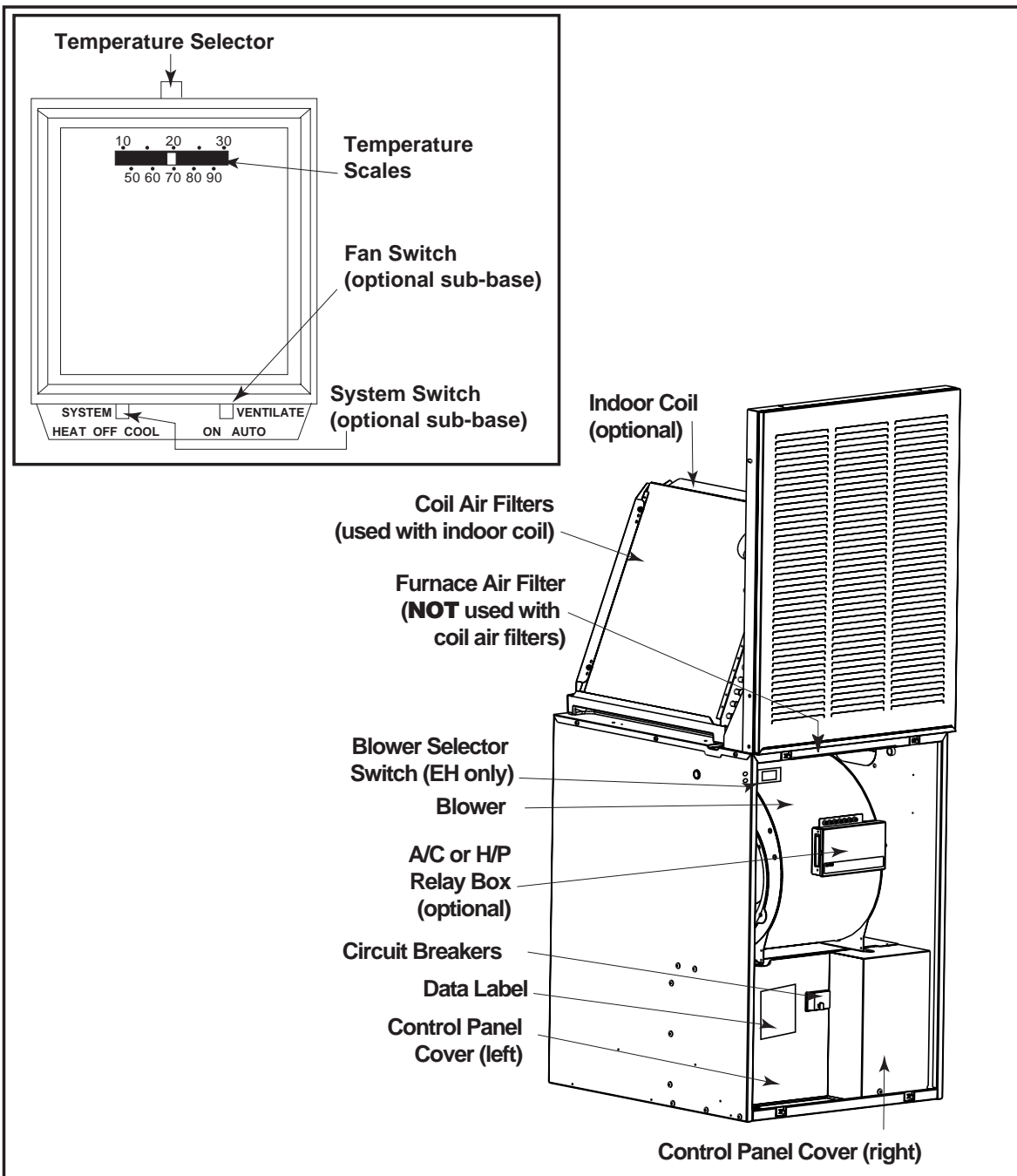
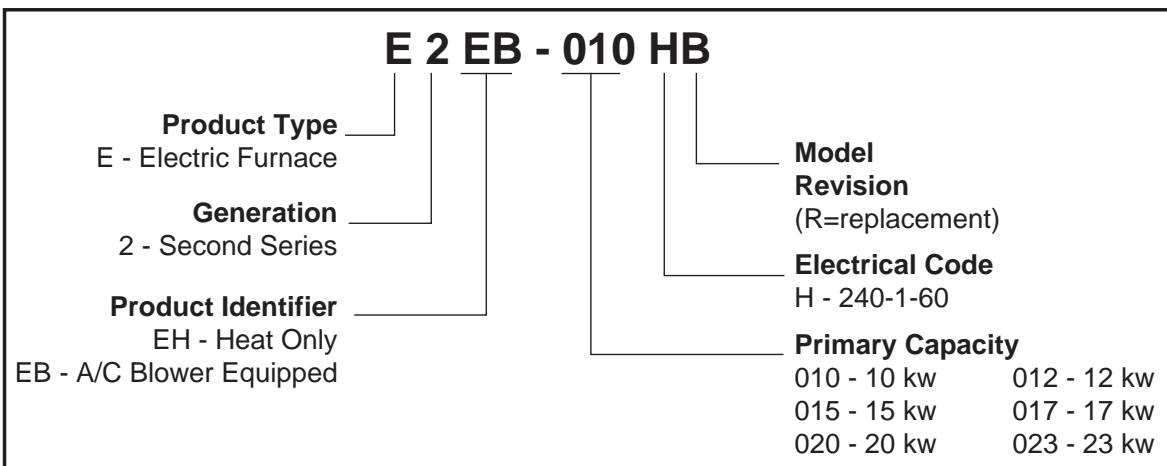


Figure 1. Furnace Parts Identification



Model Identification

 **CAUTION:**

For optional A/C or H/P systems, always wait at least five minutes after the system shuts off before restarting the system. Observe this procedure when operating the system per the following instructions.

To Operate System in Cooling Mode

NOTE: The “FAN ON/FAN AUTO” (fan switch) and “HEAT/OFF/COOL” (system switch) are located either on your thermostat (if it’s supplied with a sub-base) or on the relay box added to your furnace.

1. Make sure blower selector switch is on “Auto.”
2. Set fan switch to “AUTO.”
3. Set system switch to “COOL.”
4. Set thermostat temperature selector to desired comfort level.

To Operate System in Heating Mode

1. Make sure blower selector switch is on “Auto.”
2. Set fan switch to “AUTO.”
3. Set system switch to “HEAT.”
4. Set thermostat temperature selector switch to desired comfort level.

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

To Operate Blower Continuously

1. Set blower selector switch to “ON” for summer air circulation only (see Figure 1), OR...
2. If thermostat is equipped with optional heating/cooling sub-base or relay box (see Figure 1), set fan switch to “ON.”

To Balance Air Distribution

1. On a typical day, set thermostat selector to desired comfort level and operate system

- for several hours with all air registers open.
2. With system on, check temperature in all rooms.
3. Partially close registers in rooms that are too warm (in heating mode) or too cool (in cooling mode) and in rooms that are infrequently occupied.
4. Re-check room temperature and adjust registers as needed.

To Shut Off System

1. Make sure blower selector switch is on “Auto”.
2. Set thermostat temperature selector to lowest temperature setting, OR...
3. For thermostats with optional sub-base (see Figure 1), or for systems with relay box, set system switch to “OFF.”

 **WARNING:**

To prevent hazard of electrical shock and injury from moving parts, be certain the thermostat is off and the furnace circuit breaker(s) are in the “OFF” position before servicing. Close and properly latch the outer door after doing the following recommended maintenance.

MAINTENANCE INSTRUCTIONS

Regularly

NOTE: If a coil is installed, furnace filter is not used.

1. Replace furnace air filter (see Figure 1), OR...
2. Remove coil filters, wash, and allow to dry. Re-install coil filters to original positions.
3. Vacuum or wipe clean interior of furnace cabinet.
4. Clean all lint and dust from around furnace.

Every Six Months

1. Vacuum or wipe away any dust or lint on blower motor.

Before Each Heating Season

NOTE: If a coil is installed, furnace filter is not used.

1. Replace furnace air filter (see Figure 1), OR...
2. Remove coil filters, wash, and allow to dry. Re-install coil filters to original positions.

3. Have a qualified serviceman inspect all furnace components and field wiring and clean and service heating system as needed. If this furnace was installed with aluminum power supply wiring, have serviceman periodically check all connections to prevent possible equipment failure and/or fire hazard. Do not attempt any service function yourself which requires opening furnace control panel covers.

BEFORE YOU CALL A SERVICEMAN

1. Make sure thermostat temperature selector is set above room temperature for heating or below room temperature for cooling. If thermostat is equipped with heating/cooling sub-base, make sure system switch (see Figure 1) is set to "HEAT" for furnace operation or set to "COOL" for optional air conditioning operation.
2. Check main household service panel to see if appropriate circuit disconnect(s) for appliance power supply is on.
3. Refer to instructions under Before Operating System for pre-operation checks.
4. Refer to instructions under Before Each Heating Season for maintenance procedures and recommended service checks.
5. Refer to owner's manual provided with optional air conditioner or heat pump (if installed) for service and maintenance.

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 open the control panels (see Figure 1) at any time.

Please specify the complete model and serial numbers shown on the furnace data label (see Figure 1) 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.

OPTIONAL AIR CONDITIONER AND HEAT PUMP

Your E2 Series electric furnace is approved for use with an optional central air conditioner or a heat pump. To adapt this heating appliance to a "total comfort system," contact your nearest NORDYNE distributor.

Optional air conditioners and heat pumps are listed by Underwriters' Laboratories (UL) or Environmental Testing Laboratories (ETL) and certified by ARI and the Canadian Standards Association (CSA), or Warnock Hersey or ETLC. These cooling systems include energy-saving components to provide maximum cooling performance at electrical energy usage levels established by federal standards. Refer to the operation instruction label on your furnace for the optional air conditioning equipment approved for your heating appliance.

SECTION 2. INSTALLER INFORMATION

GENERAL

These instructions and specifications are primarily intended to assist qualified individuals experienced in the proper installation of home heating and air conditioning appliances. Some local codes require licensed personnel for the installation and service of this type of equipment. Approved installation, operation, and maintenance of this central heating system 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. Refer to local authorities having jurisdiction for further information.

Before beginning installation, read these instructions thoroughly. Follow all warnings and cautions in the instructions and on the unit.

Improper installation, service adjustment, or maintenance can cause explosion, fire, electrical shock or other conditions which may result in personal injury or property damage. Unless otherwise noted in these instructions, use only factory-authorized kits and accessories when modifying this product.

Overview of E2 Furnace

E2E(-) Series electric furnaces are available in two models. E2EH models are equipped with the standard two-speed blower. E2EH models can be easily converted for use with NORDYNE split-system air conditioners and heat pumps. E2EB models are air-conditioning ready; that is, they are equipped with a multi-speed (four-speed) blower, blower relay, and cabinet insulation kit. See Table 3 for cooling and heat pump availability with factory installed blower.

For typical non-ducted 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.

A return air grille for closet or alcove installations is available. For 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.

Power entrance for all models may be through the right side or through the bottom of the unit (when viewing the unit in a downflow position).

UNIT CHECKOUT

Before installing this furnace:

1. Inspect unit for possible shipping damage. If shipping damage is found, file claim with transportation company.

2. Record furnace model number and serial number (see furnace data label) for future reference.
3. Carefully read all instructions supplied with optional equipment to be installed with furnace.

CODES, SPECIFICATIONS, AND REQUIREMENTS

Furnace Codes

Installation and wiring of this furnace, as well as the design and construction of the home duct system, must be in accordance with one or more of the following codes:

- HUD MANUFACTURED HOME CONSTRUCTION AND SAFETY STANDARD (Title 24, Part 3280)
- American National Standards (ANSI) A119.11, C1-NFPA 7 (National Electrical Code)
- CANADIAN STANDARDS (C.S.A.) Z240.6.1, and Z240.9.1.

Listing agency(s)	May vary by model, check the unit data label for applicable agency listing mark.
Approved Installation Configurations	Approved for: single/multistory residential or mobile/modular/manufactured structures. Upflow, downflow, (freestanding/closet/alcove)
Accessibility for Servicing	Minimum of 18" (46 cm) required in front of unit.
Minimum Clearance to Combustibles	0" from all surfaces of furnace cabinet, ducts, optional coil housing and plenum connector. No separate subbase required for installations on combustible flooring.
Minimum return air opening required (total free area)	200 in. ² (1290 cm ²) heating only* 235 in. ² (1516 cm ²) A/C or H/P up to 4-ton installed.* 250 in. ² (1613) cm ² A/C or H/P up to 4 ton w/1" clearance installed. 390 in. ² (2516 cm ²) A/C or H/P up to 5 ton installed. *or return air grille and frame assembly p/n 902989 or wall mount grille p/n 902999.
Return air grille (closet or alcove installation)	Use return air grille and frame assembly P/N 902989- or equivalent for alcove installation. Use wall mount return air grided P/N 902999- or equivalent for closet installation. 155 in. ² (1000 cm ²) must be added for 5-ton A/C or H/P system.

Table 1. Miscellaneous Listings & Installation Requirements

All local codes having jurisdiction shall also apply.

Air Duct Codes and Specifications

Air ducts must be installed in accordance with National Fire Protection Association standards NFPA 90A and NFPA 90B, these instructions, and all applicable local codes.

- **Materials:** Air ducts must be aluminum, tin plate, galvanized sheet steel, or other approved materials for outlet or return air ducts.
- **Construction:** Snap-Lock or Pittsburgh-Lock seams are preferred. All other types of seams must be made tight to prevent leakage.
- **Sizing:** 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.
- **Location of Openings:** Duct system must be designed so that no supply registers are located in duct system directly below furnace.

Return Air Codes and Requirements

Non-ducted return air systems may be used for closet or alcove installations.

NOTE: Applicable installation codes may limit the furnace to installation in a single-story residence only. Furnace installations other than closet or alcove installations require ducted return air systems.

Air return to the furnace must have a minimum free area opening (see Table 1).

Acceptable floor or ceiling return air systems for closet installations with return air entering through an opening in the closet floor or ceiling must meet all of the following requirements:

- Return air opening into closet, regardless of its location, must not be smaller than size specified on unit data label.
- If located in floor of closet, return air opening must be provided with means of preventing its inadvertent closure by a flat object placed over opening.
- 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).
- Gas piping must not run in or through return air duct system.
- If return air opening is located below top of furnace, a minimum clearance must be provided between opening and furnace (see "Accessibility for servicing" in Table 1).

Closed-Off Space Requirements

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.

OPTIONAL EQUIPMENT

Contact your nearest NORDYNE distributor for a complete list of electric furnace accessories.

Return Air Grille

A return air grille and frame assembly (see Figure 2) is available for use in non-ducted 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 (not required) be equipped with the optional automatic damper when a packaged air conditioner is installed and connected to the warm air duct system. This damper prevents cooled air from discharging through the furnace cabinet, causing excessive cooling of the immediate area. Refer to instructions supplied with the damper for details.

Multi-Speed Blower Conversion Package (4 or 5 ton):

Upgrade blower packages are available for adding air conditioning or heat pump systems. See furnace "Options and Compatibility" label for systems available.

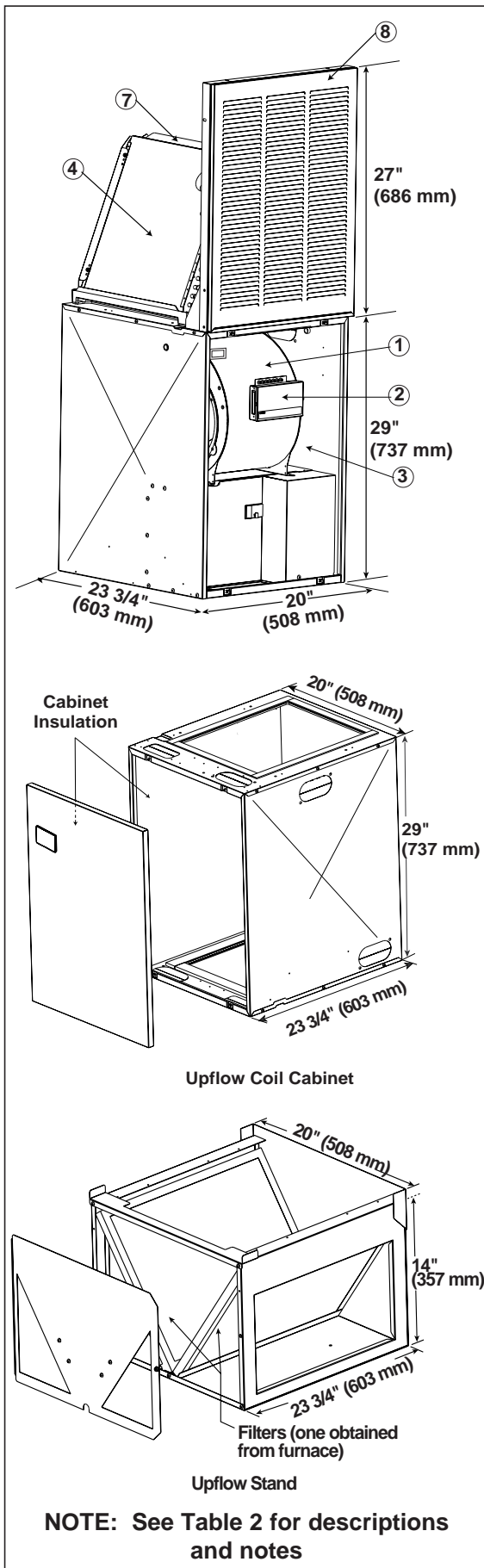


Figure 2. Optional Accessories

Item Number (See Fig.)	Description
1	4-Speed Blower 4 Ton - See Notes: 1 & 5 5 Ton - See Note: 1
2	A.C./H.P. Relay Control See Note: 1
3	Cabinet Insulation Kit See Notes: 1 & 5
4	"A"-Coil Conversion Kit See Note: 2
5	Coil Cabinet See Note: 3
6	Upflow Stand See Note: 4
7	A/C and H/P Indoor Coils
8	Return Air Grille and Frame Assembly

Notes:

- 1) For A/C and H/P use.
- 2) Includes coil filters.
- 3) For upflow or downflow installations.
- 4) For upflow A/C or H/P installations (includes one filter; use filter from furnace to complete filtering system in this accessory).
- 5) Standard in EB models.

Table 2. Optional Air Conditioning and Heat Pump Equipment

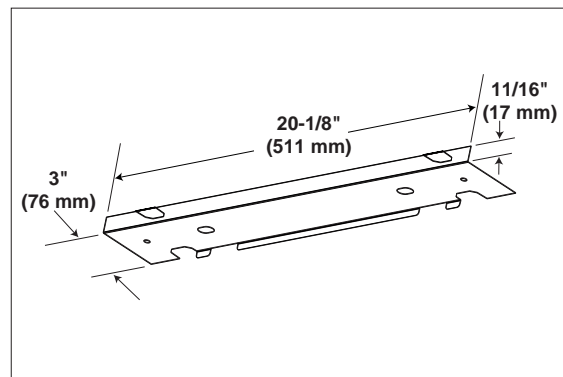


Figure 3. Optional Rear Mounting Plate (P/N 389080)

Electric Furnace Models	E2EH										E2EB				
	010H	012H	015H	015HR	017H	020H	023H	010H	012H	015H	015HR	017H	020H	023H	023H 5-Ton
Rated Heating Output, Btuh (see note 1)	35,000	41,000	53,000	57,000	57,000	70,000	75,000	35,000	41,000	53,000	57,000	57,000	70,000	75,000	75,000
Watts (Total kw, Heating Elements and Blower)	10.4	12.0	15.4	16.6	16.6	20.4	22.0	10.4	12.0	15.4	16.6	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)	2 (15.0)	3 (16.2)	3 (16.2)	4 (20.0)	4 (21.6)	2 (10.0)	2 (11.6)	2 (15.0)	3 (16.2)	3 (16.2)	4 (20.0)	4 (21.6)	4 (21.6)
Blower Wheel Size	10.5" Dia., 8" Wide														
Motor Speed, H.P., Rating, Amps	2 Speed, 1/5 HP, 2.0														
Test ESP, in. w.c. Max	0.3														
Optional Cooling Available with factory installed blower	2.0 - 3.0 Ton (see note 3)														
Optional Heat Pump Available with factory installed blower	2.0 - 3.0 Ton (see note 3)														
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 speed blower allowing the units to accept up to 5 tons of air conditioning or 4 tons heat pump.
3. The factory installed blower for the EH models can be replaced with a multi-speed blower allowing the units to accept up to 5 tons of air conditioning or 4 tons heat pump.
4. 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 3. Unit Specifications

TYPICAL INSTALLATION OF DOWNFLOW SYSTEMS OR PLATINUM SYSTEM

The following steps describe installation instructions for an under-the-floor supply duct system with a return air system that can be either non-ducted or ducted. Duct connectors (Table 4) are recommended for this application.

NOTE: Before installing this furnace, consider all clearances for the installation and future servicing of the furnace. Refer to Table 1.

Return Air and Filtering Systems

Furnaces may be installed with non-ducted or ducted return air. For non-ducted return air systems, either the optional grille and frame assembly or the optional wall mount grille is recommended. 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 is recommended. The duct system must be properly sized so as to account for any additional external static pressure produced from the chosen filtering method.

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

Filtering Methods - Non-Ducted Return Air

- 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 4).
- 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.

Filtering Methods - Ducted Return Air

- Without optional coil housing:
 - install a filter with a minimum unrestricted medium area of 324 square inches 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 square inches in the duct above the coil that is accessible for monthly cleaning or replacement by homeowner.

Optional 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

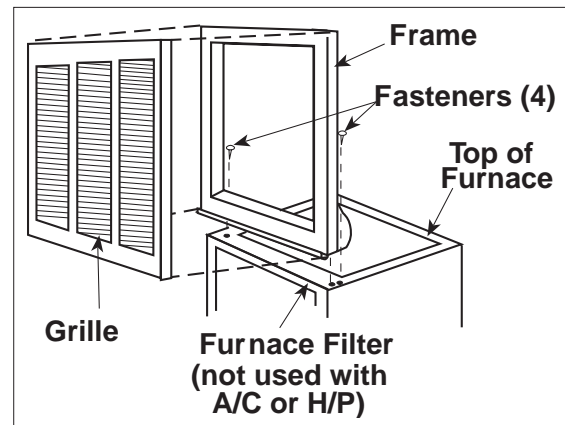


Figure 4. Grille Support Frame and Grille Assembly

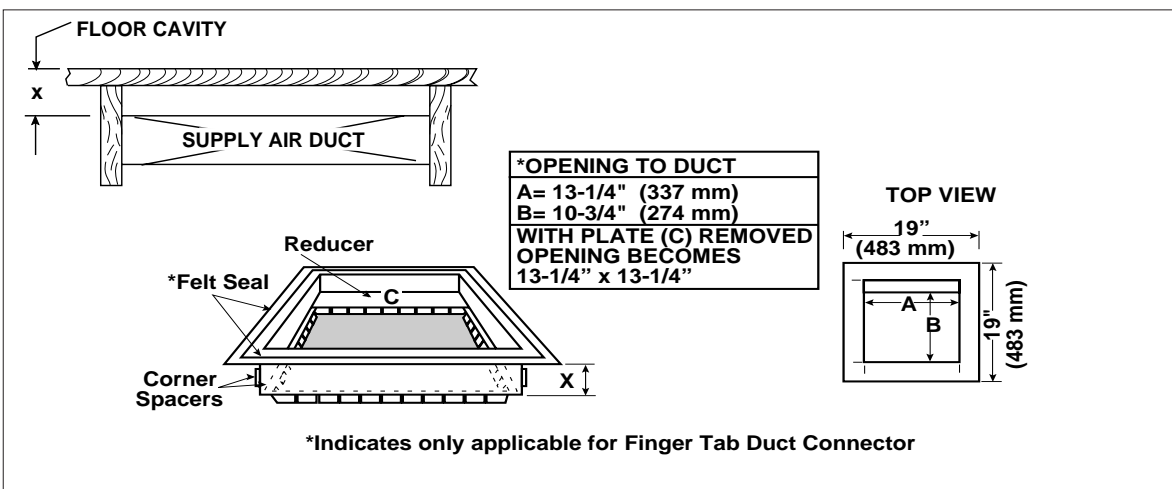


Figure 5. Duct Connector Selection (Non-Platinum)

combustible flooring without a separate sub-base. Also, the furnace rear mounting plate (see Figure 3) supplied with the duct connectors is recommended for use with this type of installation.

Selecting Duct Connector

Non Platinum Duct Connector

1. Determine depth of floor cavity from surface of floor to top of supply air duct (see Figure 5).
2. Select appropriate model from Table 4 which matches X-dimension of floor cavity. To maximize air delivery, remove reducer (C in Figure 5) to obtain largest open area that will fit duct/floor construction.

NOTE: Duct connectors may be installed in any one of four positions.

Platinum Duct Connector

1. The 14" round duct connector (903896) is designed to connect directly to a 14" flex-duct.

If "X" floor cavity is:		Use Duct Connector Model Part Number	
English	Metric (mm)	Finger Tab	Screw Down
7/8"	22	901987	904008
2"	51	901988	904009
4 1/4"	108	901989	904010
6 1/4"	159	901990	904011
8 1/4"	210	901991	904012
10 1/4"	260	901992	904013
12 1/4"	311	901993	904014

Table 4. Floor Cavity Sizes

Preparing Floor Opening(s)

1. Mark floor opening(s) as shown in Figure 6. Provide minimum clearances at rear and right side walls of closet or alcove for installation of furnace and wiring.
2. Cut floor opening on outside edge of marked line so that opening is slightly larger than area marked.
3. 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.
4. The refrigerant and entrance supply opening dimensions may be adjusted $\pm 1/2$ ".

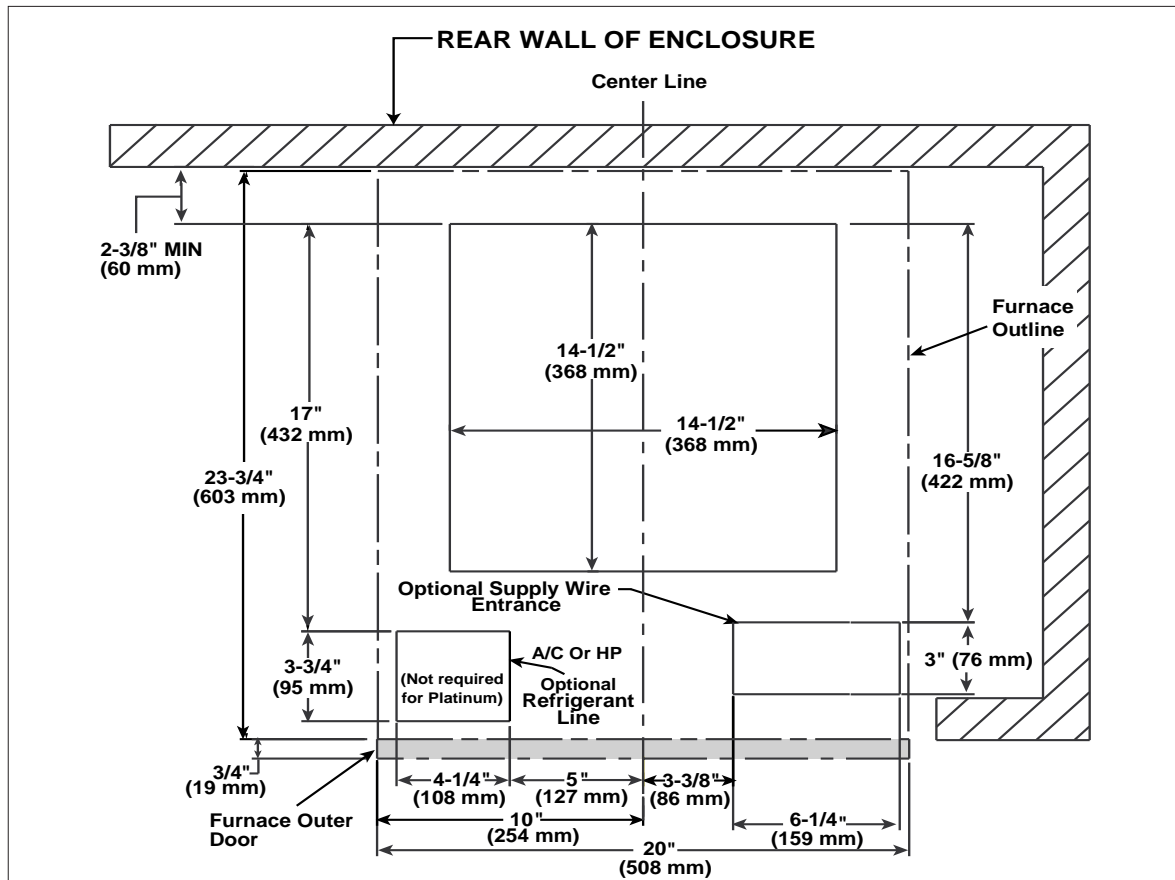


Figure 6. Downflow Floor Cutout Locations (nominal dimensions)

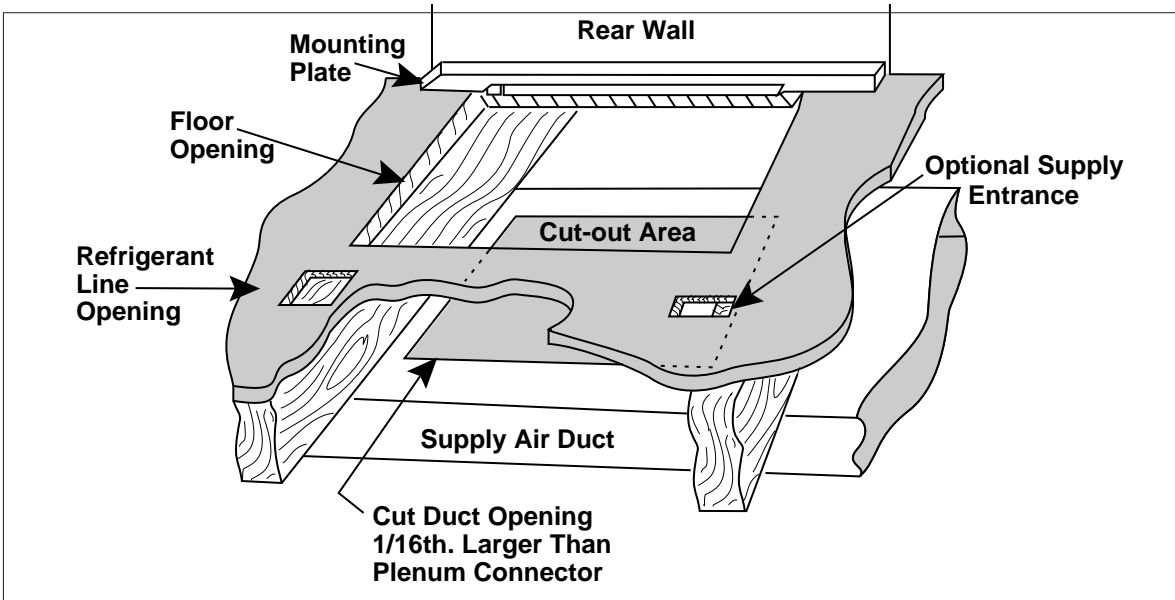


Figure 7. Rear Mounting Plate

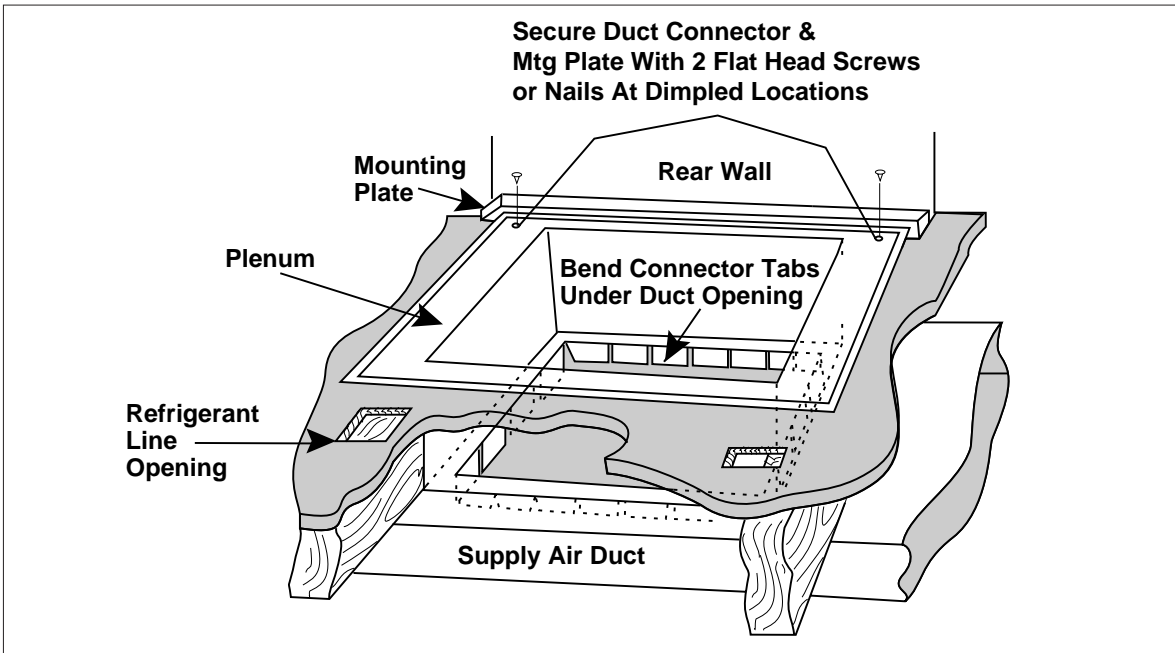


Figure 8. Duct Connector (Non Platinum)

Installing Duct Connector

NOTE: The duct connector is designed for use on ducts down to 12" wide. On typical ducts, the finger tab duct connector may be installed using Method B. On narrow ducts, there may be insufficient clearance to bend the tabs on two sides of the finger tab duct connector. In such cases, use Method C or D. For screw down duct connector use method E. For Platinum models always use method A.

Method A - Platinum Series

NOTE: Flex duct used must have a minimum

temperature rating of 200° F and meet all other applicable codes and standards.

1. Place duct connector through opening in floor. See Figure 9.
2. Connect 14" supply duct.

Method B

1. Place duct connector through floor opening with bottom tabs resting on top of supply air duct. Mark cutout area around inside of tabs.
2. Remove duct connector and cut out duct opening slightly larger than area marked.
3. If using optional rear mounting plate (sup-

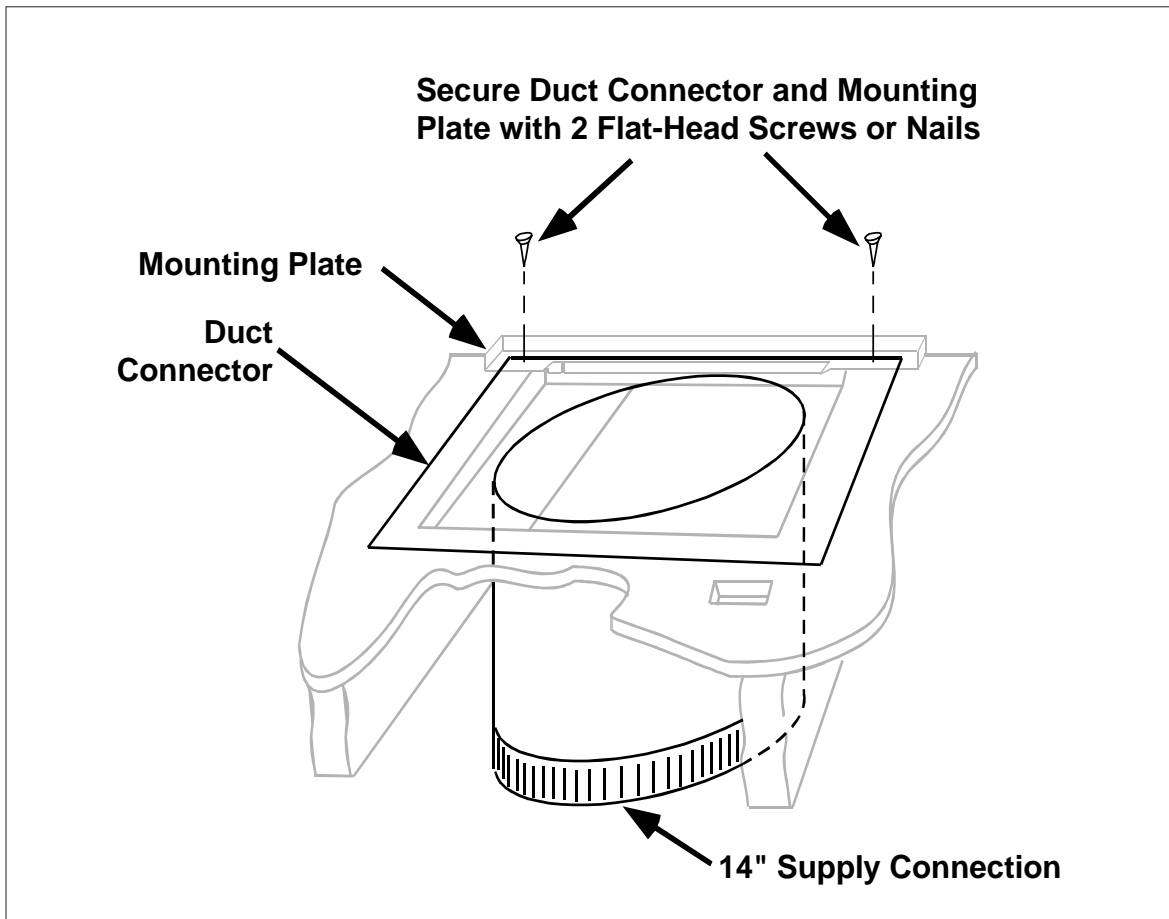


Figure 9. Platinum Duct Connector

- plied with duct connector), install it to back edge of floor opening (see Figure 7). Re-install duct connector in floor opening. A shim may be used, if necessary, to ensure the furnace is level.
4. Secure duct connector to floor with two flat-head fasteners at dimpled locations (see Figure 8).
 5. Secure connector to duct by bending bottom tabs under and up against duct surfaces (see Figure 10).

Method C

1. Attach tabs to sides of duct (one on each side) using sheet metal fasteners or other method, ensuring that the duct connector is secure and sealed to the duct (see Figure 11).
2. Seal the duct flap edges with an approved tape or compound for a leak-free joint.

Method D

1. Score and cut top of metal duct as indicated in Figure 12, Step 1 or Step 2. If using Step 1, also cut out metal from the shaded area "A".

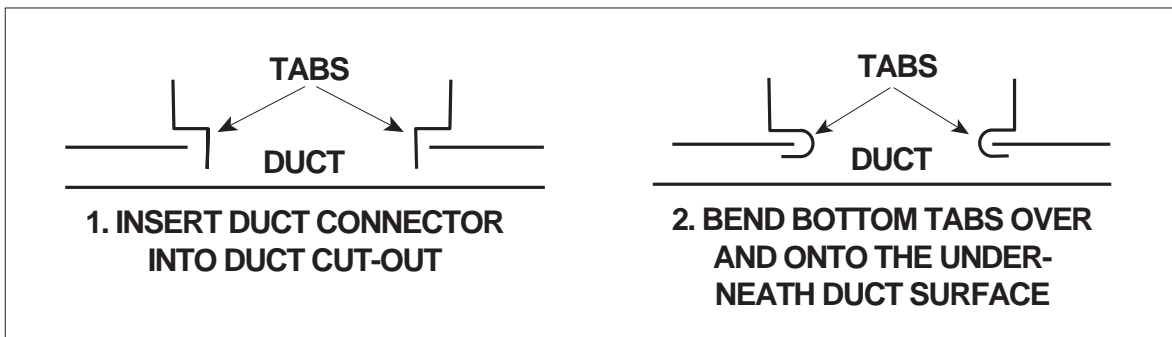


Figure 10. Duct Connector Installation B

2. Fold the duct flap "B" up (see Figure 12, Step 3).
3. At the front-to-back of duct run (see Figure 12, area "A"), bend the duct connector tabs and secure them directly to the duct.
4. At area "B", bend the duct connector tabs up and back over, around the duct connector (see Figure 12, step 3).
5. Fold/form the duct flap against the side of the duct connector and attach as shown (see Figure 12, Step 4). Use at least three staples on each duct flap OR... if a 2X block/joist is not provided, use at least two sheet metal fasteners on each duct flap.
6. Seal the duct flap edges with an approved tape or compound for a leak-free joint.

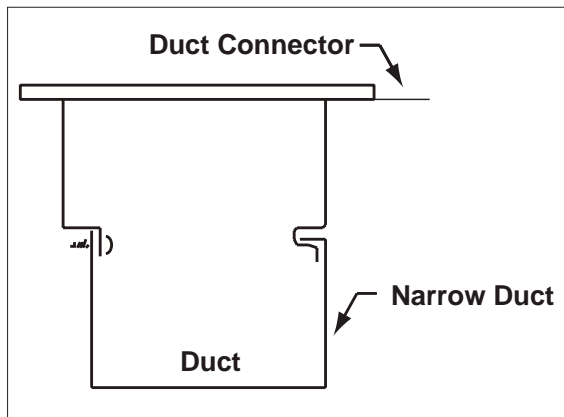


Figure 11. Alternate Duct Connector Installation C

Method E

1. Apply a bead of caulking, mastic, or other approved sealant around bottom side of 1/2" flange and restrictor plate, when applicable.
2. Locate the duct connector over duct and carefully lower screw down duct connector into place.
3. Once duct connector is located on duct, temporarily hold in place while fastening duct connector to the floor using flat head screws or nails. Be sure flanges of duct connector stay in contact with the duct.
4. Screw duct connector to duct making sure a seal is made between the duct and the duct connector. Additional screws may be added if required.
5. Cut away duct along edge of duct connector flange allowing the center to drop into the duct. Remove section of duct with caution, as edges will be sharp.

Alcove Installation

1. Cut alcove rough openings to minimum dimensions shown in Figure 13.
2. Attach frame assembly with four fasteners (provided or equivalent) into pre-punched holes on top of furnace (see Figure 5).
3. At manufacturers discretion, if additional securement is required attach each side of frame assembly to alcove opening using holes provided.

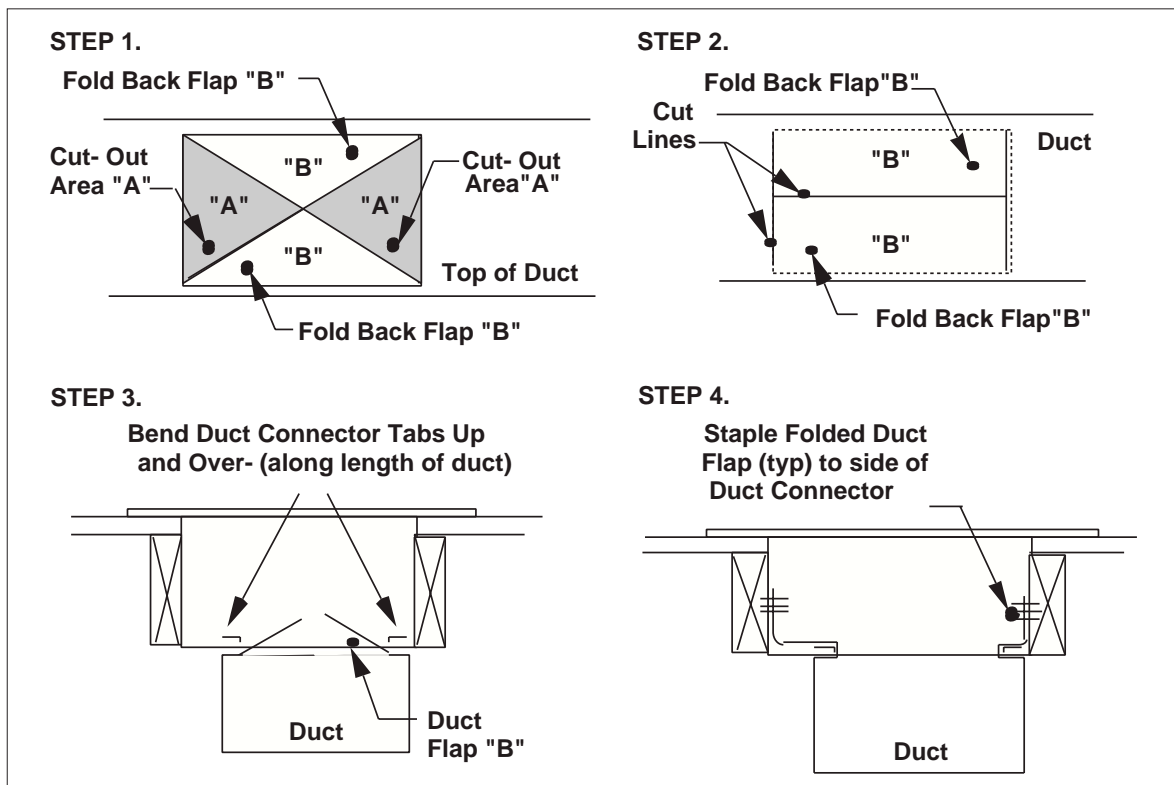


Figure 12. Alternate Duct Connector Installation D

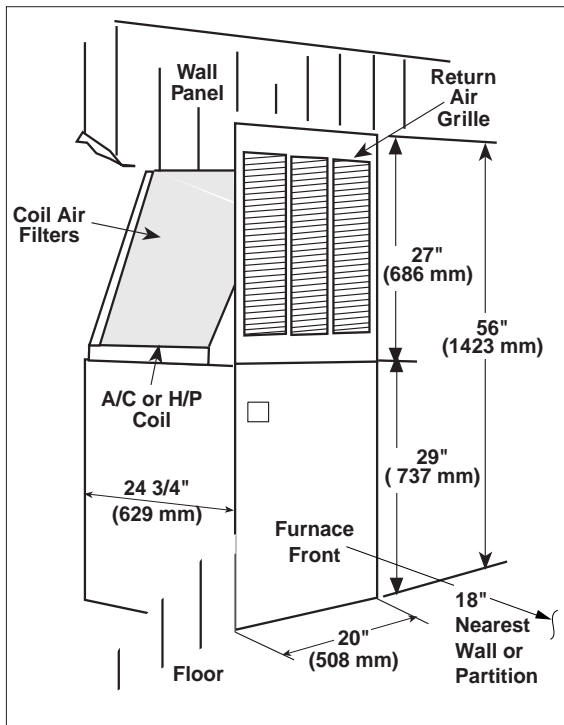


Figure 13. Typical Alcove Installation

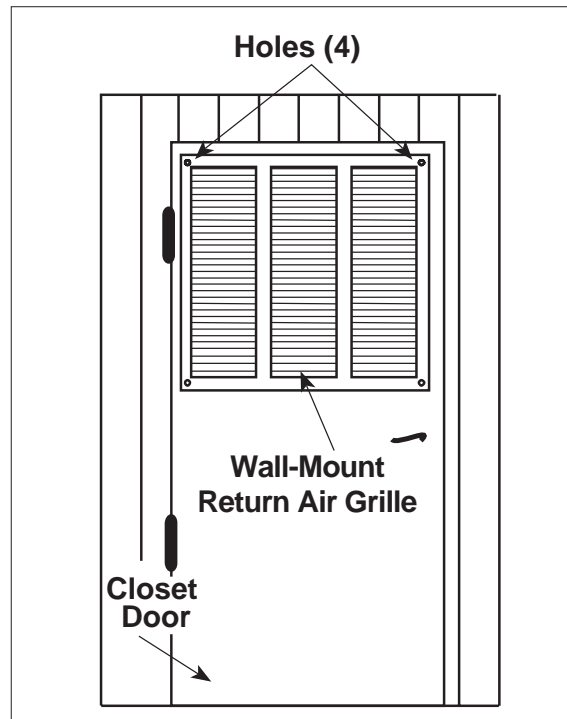


Figure 14. Typical Closet Installation

4. Attach return air grille to frame assembly by hooking grille over flange on top of frame and into channel on bottom.

Closest Installation

NOTE: For closet installations, the return air grille mounting frame is not used since the furnace is located inside the closet (see Figure 14 and 15).

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.

Furnace Installation

1. Install 240V supply circuit(s) and 24V wiring to closet or alcove (see Figure 16 for appropriate 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, OR... If mounting plate is not used, an equivalent method of securing the rear of the unit may

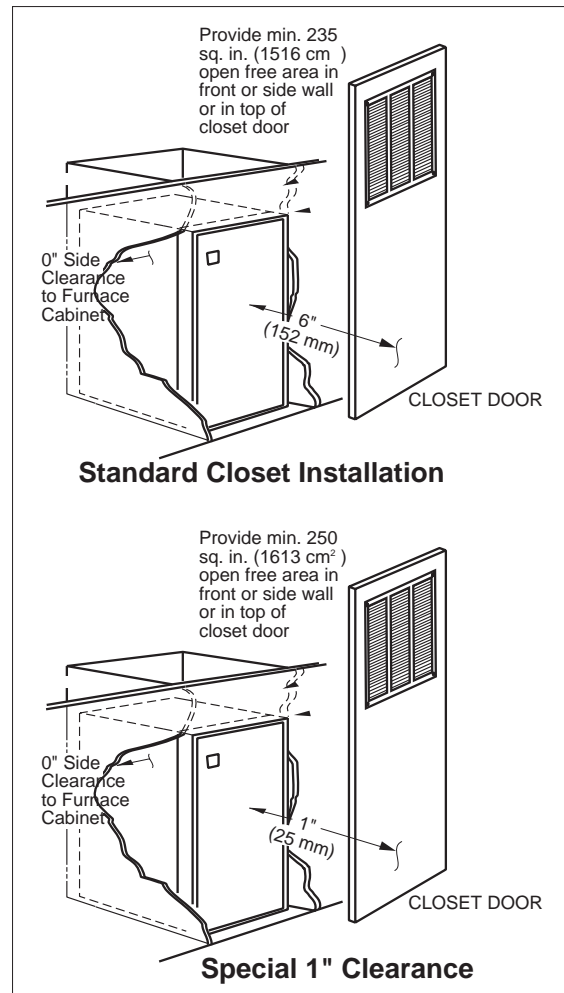


Figure 15. Closet Installation

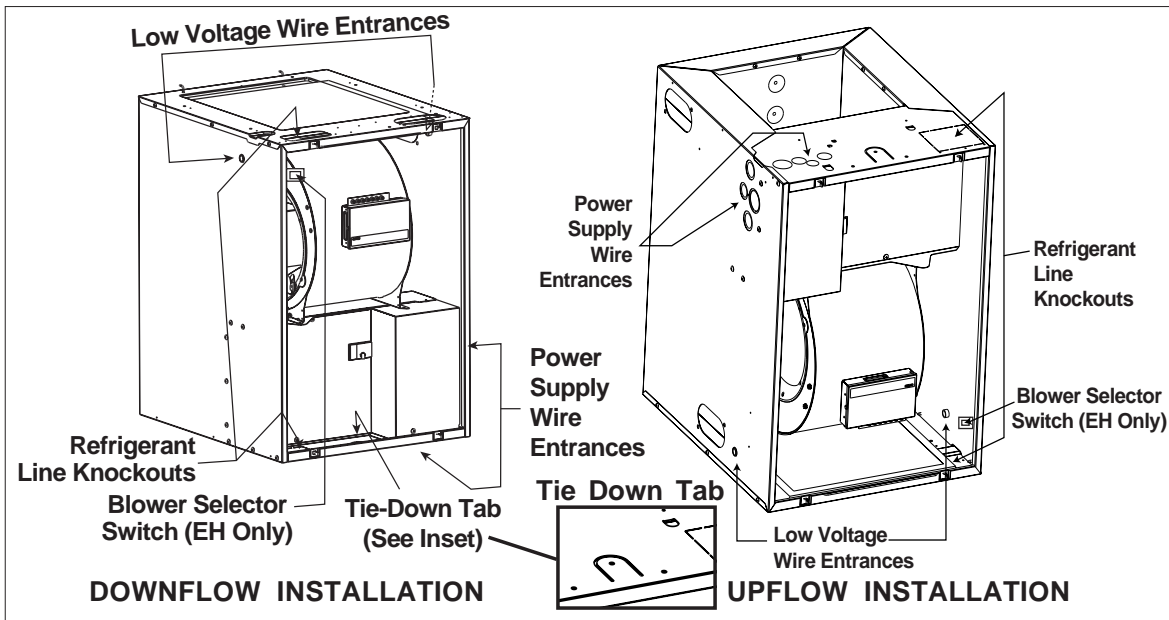


Figure 16. Downflow and Upflow Installations

be used as long as it prevents displacement during transport if used in a manufactured home.

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

- Secure front of unit with one or more fasteners at mounting hole(s) provided or at tie-down tab (see Figure 16).

- See Electrical System Installation to complete furnace installation.

TYPICAL INSTALLATION OF UPFLOW SYSTEMS

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

NOTES:

- Before installing this furnace, consider all clearances for the installation and future servicing of the furnace. Refer to Table 1.
- 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. See Relay Control installation instructions for further details.

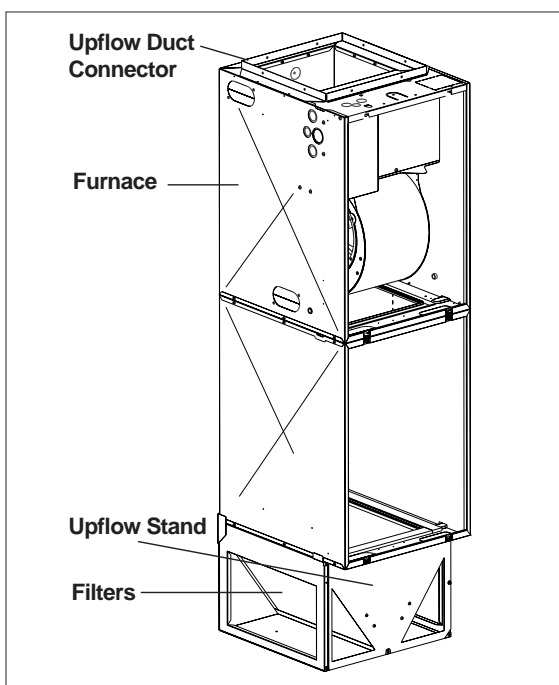


Figure 17. Over-the-Floor Return Air System with Upflow Stand

Return Air and Filtering Systems

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

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

Filtering Methods - Non-Ducted Return Air

1. Without optional upflow stand: (see Figure 18)
-install a filter with a minimum unrestricted medium area of 324 square inches below the coil cabinet/furnace assembly that is accessible for monthly cleaning or replacement by the homeowner
2. With optional upflow stand: (see Figure 17)
-stand 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 upflow stand instructions for additional details.

Filtering Methods - Ducted Return Air

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

Applications and Furnace Installation

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

Refer to instructions supplied with accessory equipment.

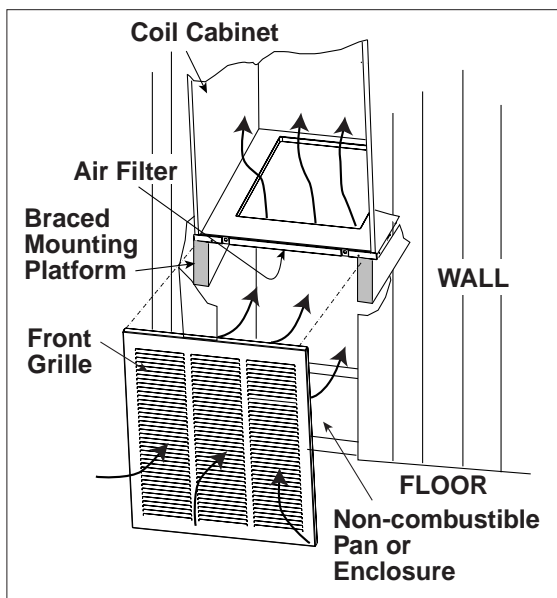


Figure 18. Over-the-Floor Return Air System

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

1. 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 18).
2. Use optional upflow stand with filters or construct a suitably braced mounting platform in closet (see Figure 17 or 18).
3. Install 240V supply circuit(s) and 24V wiring to closet (see Figure 16 for appropriate locations).
4. Position optional coil cabinet onto upflow stand or mounting platform and secure with three or more fasteners.
5. Position furnace in upflow mode 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 17)
7. Install return air grille in closet preferably at same level as upflow stand or below mounting platform (see Figure 18).

NOTE: Be certain to provide an adequate free return air area as described under Return Air Codes and Requirements and Closed-Off Space Requirements.

Through-the-Floor Return Air System (Ducted)

1. Prepare Floor Opening(s):
 - a. Mark floor opening(s) as shown in Figure 19. 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. Install 240V supply circuit(s) and 24V wiring to closet (see Figure 16 for appropriate locations).
4. Position optional coil cabinet over floor cutout and secure with three or more fasteners.

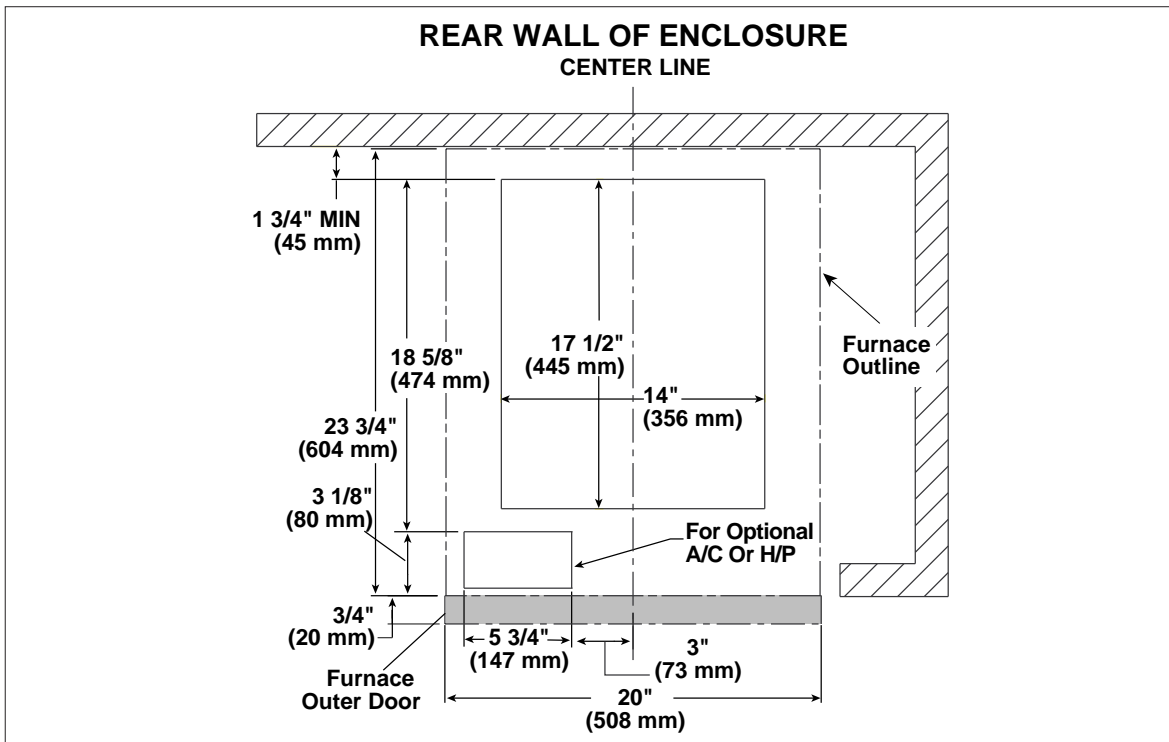


Figure 19. Upflow Floor Cutout Locations (nominal dimensions)

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 17).

ELECTRICAL SYSTEM INSTALLATION

! WARNING:

To avoid the risk of electrical shock, personal injury or death, disconnect all electrical power to the unit before performing any maintenance or service. The unit may have more than one electrical power supply.

Codes, Specifications, and Requirements

The wiring, installation, and electrical hookup of this furnace must comply with the National Electrical Code (or the Canadian Electrical Code) and all regulations of local authorities having jurisdiction. See Table 6a & 6b for minimum circuit ampacity, maximum over-current protection, and recommended wire size. See

the unit wiring diagram for other wiring details. Supply-circuit requirements are as follows:

- -010 model is factory-wired for single-branch supply circuit only.
- -012 models are factory-wired for single-branch supply circuit (single-circuit kit installed). Dual-branch circuit can be used by removing factory-installed single-circuit kit (see Figures 20 and 21).
- -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 .

! IMPORTANT:

Note: Circuit breakers installed within this unit are for short-circuit protection of the internal wiring and to serve as a disconnect. Circuit breakers installed within this unit **DO NOT** provide over-current protection of the supply wiring and therefore may be sized larger than the branch circuit protection.

Connecting Supply Service Wires

1. Remove right-hand control panel (when viewing in downflow position).
2. Locate power supply hole plugs in side of unit and in bottom of unit. Remove appropriate plug(s) or knockout opening applicable to recommended wire size(s).
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 20 and 21).

NOTE: To install single-circuit kit, perform step 5. If single-circuit kit installation is not necessary, go to step 6.

5. To install 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.

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.

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".

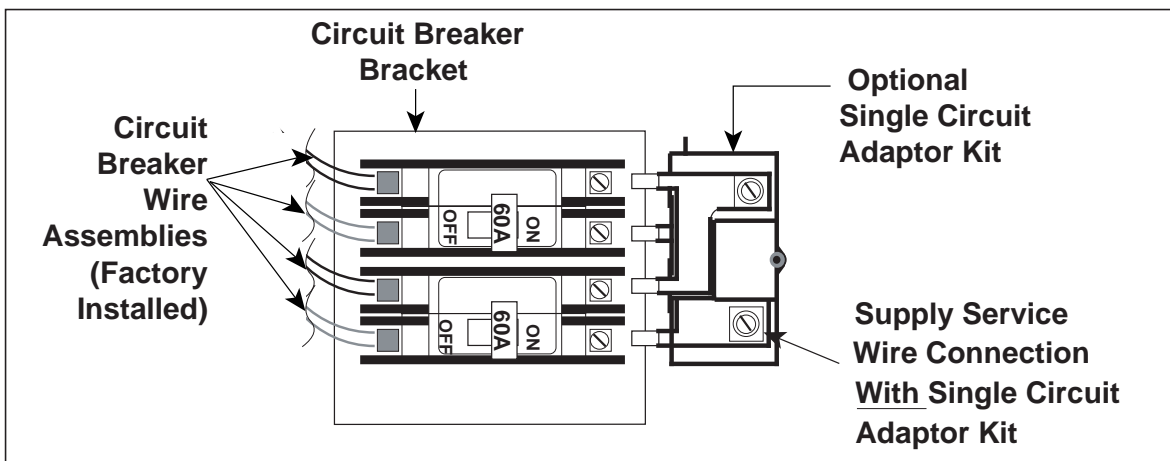


Figure 20. Installation of Optional Single Circuit Adaptor Kit

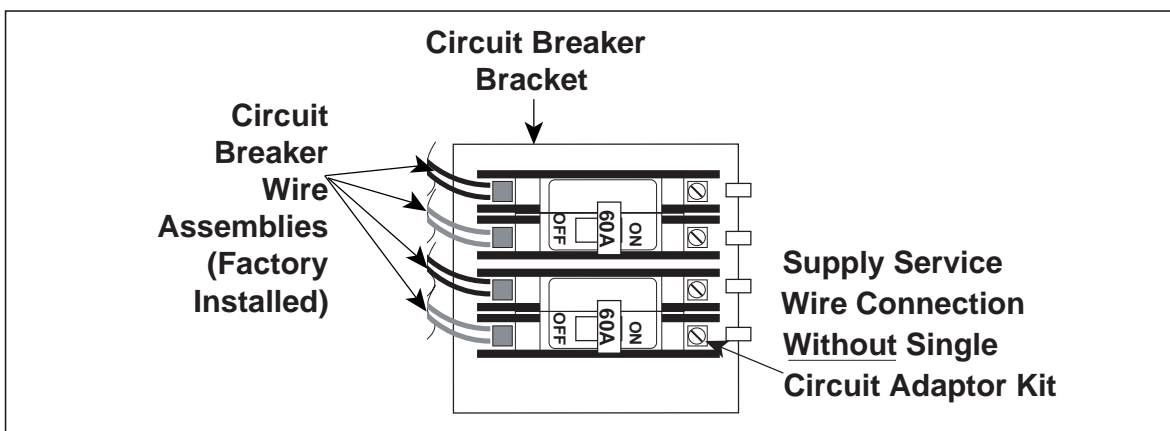


Figure 21. Installation of Supply Service Wires

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 and remove.
5. Install new blower ensuring the side flanges engage under side mounting tabs (three on one side, one on the other) and the long tab in the rear.
6. Replace screws previously removed from blower.
7. Connect the motor plug to the control panel receptacle.
8. Switch circuit breaker(s) to "ON", reinstall furnace front door, and turn on electrical supply circuits to the furnace.

Selecting Blower Speed

See Table 5 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 accomplished through use of the 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 blower speed(s) set at factory.



IMPORTANT:

If a relay box is installed, blower speeds for heating and cooling are set inside the relay box (see instructions included with 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 5.

Changing Blower Speed

E2EH: The selected heating blower lead is attached to the wire lead attached to terminal 2 of the blower selector switch.

- a. Remove blower lead from the wire lead off of terminal 2.
- b. Choose desired speed.
- c. Attach new blower lead to wire lead off terminal 2 of blower selector switch.

E2EB: The selected heating blower lead is attached to the heating blower relay. The selected cooling blower lead is attached to the cooling blower relay.

- a. Remove heating blower lead from heating blower relay.
- b. Choose desired speed and install new blower lead onto blower relay for new heating speed.
- c. Remove cooling blower lead from cooling blower relay.
- d. Install new blower lead onto blower relay for new cooling speed.

See Table 7 for blower performance data.

One Speed for both Heating and Cooling

If you would like to have the same blower speed for both heating and cooling do the following:

- a. Remove the cooling blower lead from the cooling relay and remove the heating blower lead from the amp terminal on the heating relay.
- b. Attach the white jumper wire (found in the wire tie) to the cooling relay and the amp terminal on the heating relay.
- c. Choose desired speed and attach that blower lead to the amp terminal on the heating relay.

Plug/Receptacle Position	Pin1	Pin2	Pin3	Pin4
2 Speed Blower	Low	High	-	-
3 Speed Blower (Alternate)	-	Low	Med	High
4 Speed Blower	Low	Med-Lo	Med-Hi	High
Control Box Blower Lead	Red	Yellow	Blue	Black

↑
Minimum approved speed for all models.

Table 5. Furnace Blower Speed Data

Model Number E2E(*)	Supply Circuit	Total Amperes	Maximum Over-current Rating	Minimum Circuit Ampacity	Copper Wire Size - See Caution Below		Ground Wire Size	Low Voltage Thermostat Wire Size	
					60°C (e.g., Romex)	90°C (e.g., SEU)			
-010-HB	Single	45.5	60	57	4	6	10	2-Wire system maximum wire lengths: 24 Ga.= 55' 22 Ga.= 90' 20 Ga.= 140' 18 Ga.= 225'	
-012-HB	Single	52.1	70	65	4	6	8		
	Dual "A"	28.0	40	35	8	8	10		
	Dual "B"	24.2	30	30	10	10	10		
-015-HB	Single	66.3	90	83	2	4	8		
	Dual "A"	35.1	50	44	6	8	10		
	Dual "B"	31.3	40	39	8	8	10		
-015-HR	Single	71.3	90	89	2	4	8		
	Dual "A"	48.0	60	60	4	6	10		
	Dual "B"	22.5	30	28	10	10	10		
-017-HB	Single	71.3	90	89	2	4	8		4 or more Wire systems maximum wire lengths: 24 Ga.= 25' 22 Ga.= 45' 20 Ga.= 70' 18 Ga.= 110'
	Dual "A"	48.0	60	60	4	6	10		
	Dual "B"	22.5	30	28	10	10	10		
-020-HB	Single	87.1	125	109	0	2	6		
	Dual "A"	45.5	60	57	4	6	10		
	Dual "B"	41.7	60	52	4	6	10		
-023-HB	Single	93.8	125	117	0	2	6		
	Dual "A"	48.0	60	60	4	6	10		
	Dual "B"	45.5	60	56	4	6	10		

* Can be H or B

CAUTION: When sizing the wire, you must follow the guidelines of the latest revision of the NEC. NM-B wire is equivalent to "Romex" cable. SEU is equivalent to service entry cable. For NEC type NM-B wire, you must size the wire using 60C ratings per NEC article 326.

Minimum overcurrent protection per NEC 424-3b not to be less than 125% of total amps for fixed resistance heat.

Table 6a. Electrical Specifications

Model Number E2E(*)	Circuit "A"		Circuit "B"	
	Wire Gauge and Type	Breaker Size	Wire Gauge and Type	Breaker Size
-12-HB	#8 NM-B	40 amp	#10 NM-B	30 amp
-15-HB	#8 SEU	50 amp	#8 NM-B	40 amp
-15-HR	#6 SEU	60 amp	#10 NM-B	30 amp
-17-HB	#6 SEU	60 amp	#10 NM-B	30 amp
-20-HB	#6 SEU	60 amp	#6 SEU	60 amp
-23-HB	#6 SEU	60 amp	#6 SEU	60 amp

Table 6b. Recommended Electrical Application Guide for Dual Circuit Installations**

**Alternate wiring combinations can be used. Refer to the latest revision of the NEC for these appropriate alternate combinations.

Installing Control Circuit Wiring

NOTE: Installation of a five-wire thermostat circuit is recommended to provide for future addition of a heat/cool thermostat.

1. Install the 24V control-circuit cable through plastic bushing at either side of furnace.
 - a. For models without a relay box, connect wires to furnace at blower plug pigtails (see wiring diagrams). Secure all connections with wire nuts.
 - b. For units with a 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 8 or per the marking on the unit.
4. See Figure 31 (non-Platinum) and Figure 32 (Platinum) for E2EB thermostat connections.

Standard E2EH Blower with Filter, @ 0.3" ESP		
Pin No.	Speed	CFM
#1	Low	840
#2	High	1160
4-Ton Blower with Coil and Coil and Filters, @ 0.3" ESP		
Pin No.	Speed	CFM
#1	Low	880
#2	Med.-Low	1170
#3	Med.-High	1310
#4	High	1460
5-Ton Blower, with Coil and Coil Filters, @ 0.3" ESP		
Pin No.	Speed	CFM
#1	Low	990
#2	Med.-Low	1320
#3	Med.-High	1620
#4	High	1790

Table 7. Blower Performance

SYSTEM CHECKOUT

Checking Installation

1. Refer to appropriate wiring diagram and recheck all wiring connections. Ensure that all connections are tight.
2. Check blower motor and relay box connectors for proper connection.
3. Reinstall control box cover(s).
4. Switch circuit breaker(s) to "ON" position.
5. Set furnace blower selector switch (see Figure 16) to "AUTO" (EH Units only).
6. Replace outer furnace door.
7. Check all duct connections and tape for air leakage.

Furnace Model	Thermostat Anticipator Setting
EH-10, 12, 15	0.30
EH-17, 20, 23, 15 HR	0.60
EB-10, 12, 15	0.50
EB-17, 20, 23, 15 HR	0.75

Table 8. Anticipator Settings

ALL MODELS	CLOSET	ALCOVE
Front ‡	6"	18"
Back	0"	0"
Sides	0"†	0"†
Top	0"	0"
Top and Sides of Duct	0"	0"
Bottom of Duct	0"	0"

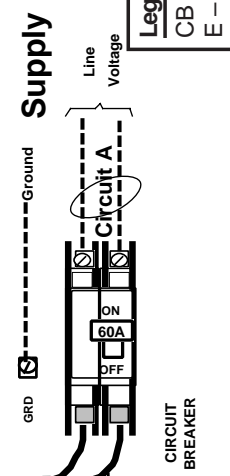
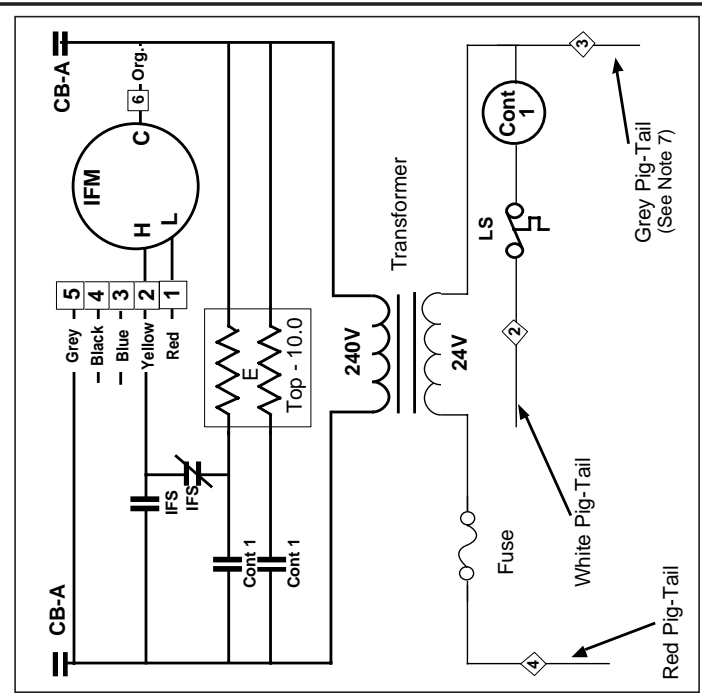
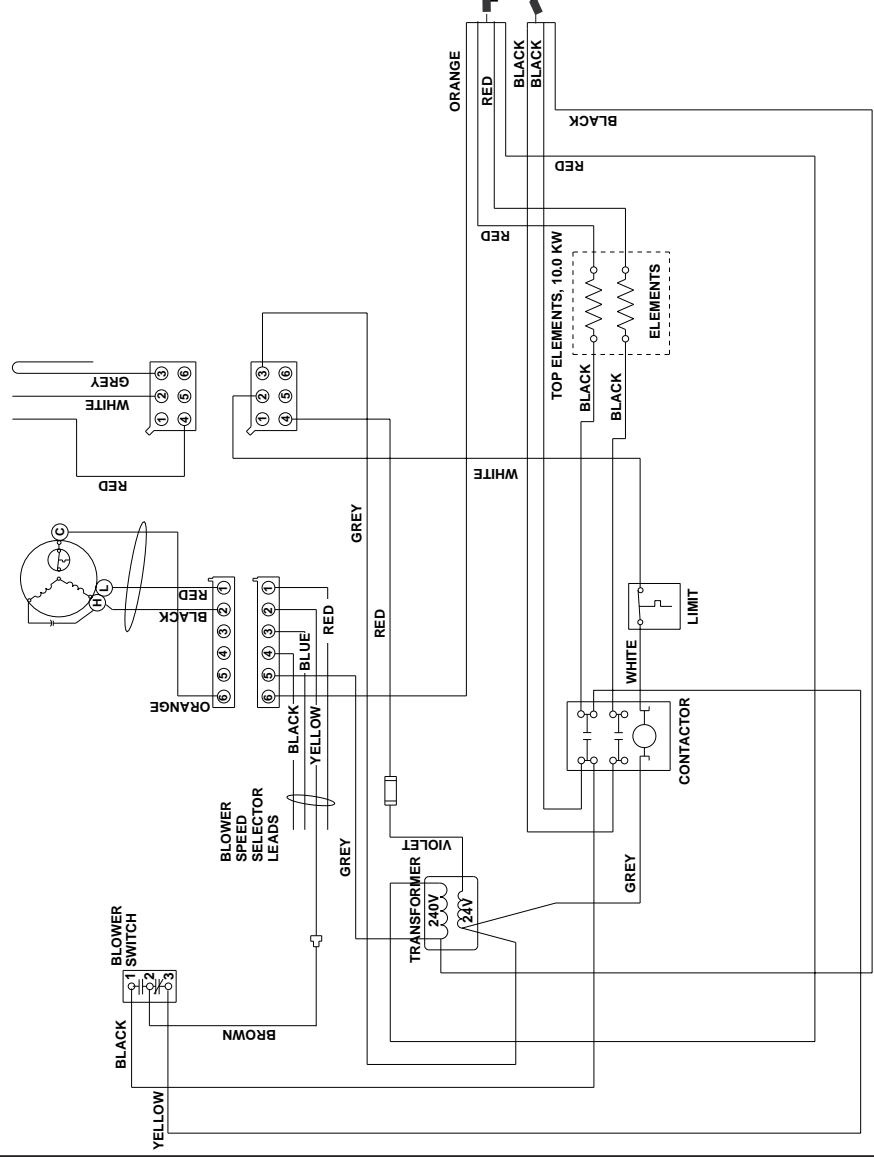
‡ Service Clearance

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

Table 9. Clearances

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.30 Amps.
- 3) To change blower speeds on units without a relay box installed refer to installation instructions.
- 4) Refer to furnace and/or relay box installation 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) This wire is used with some accessories. See accessory Installation Instructions for further details.



WARNING:
Switch circuit breakers to the OFF position before servicing the furnace.

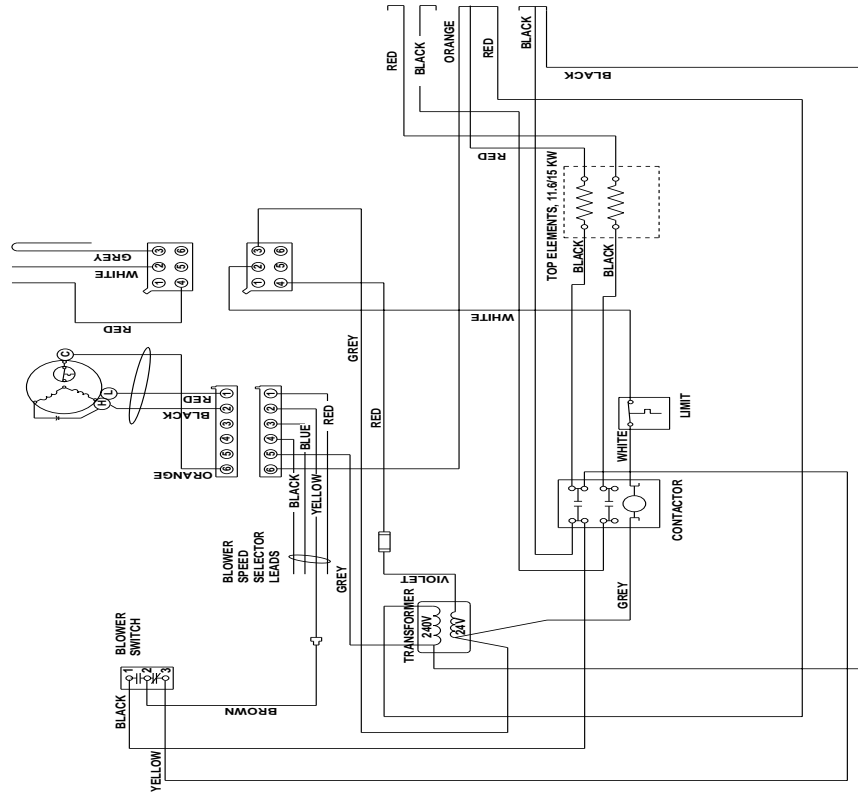
Legend:

—	CB	– Circuit Breaker
—	E	– Heater Element
—	IFS	– Fan Switch
—	Cont	– Contactor
—	LS	– Limit Switch
□		– Fan Plug
◇		– Control Plug
IFM		– Fan Motor

Figure 22. E2EH 010 Wiring Diagrams

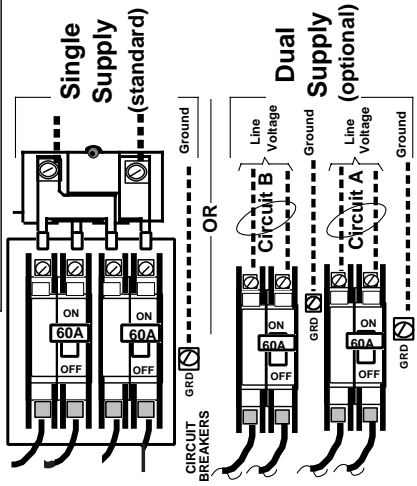
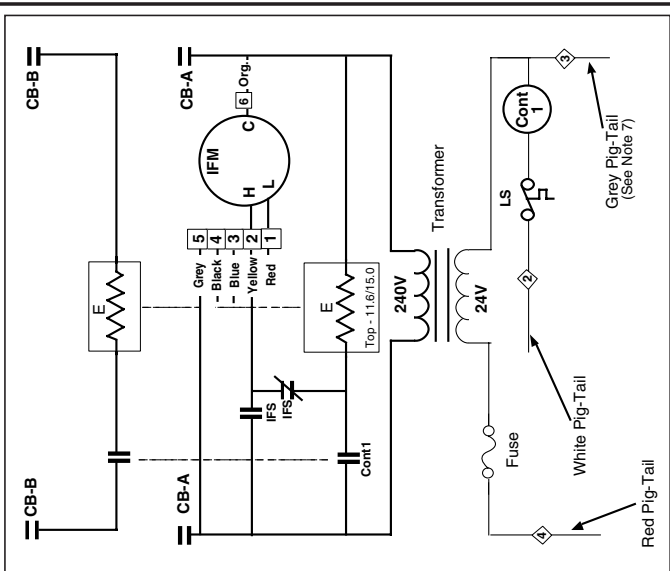
NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.30 Amps.
- 3) To change blower speed on units without a relay box refer to installation instructions.
- 4) Refer to furnace and/or relay box installation 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) This wire is used with some accessories. See accessory installation instructions for further details.

! WARNING:
Switch circuit breakers to the OFF position before servicing the furnace.



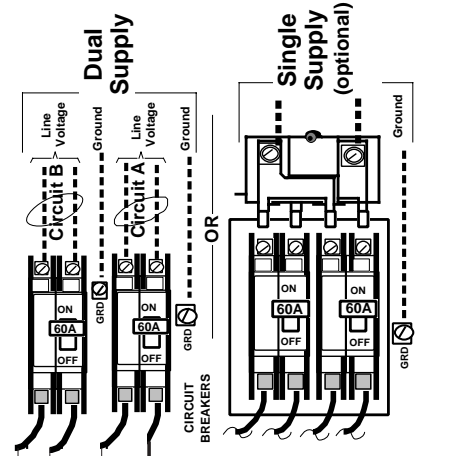
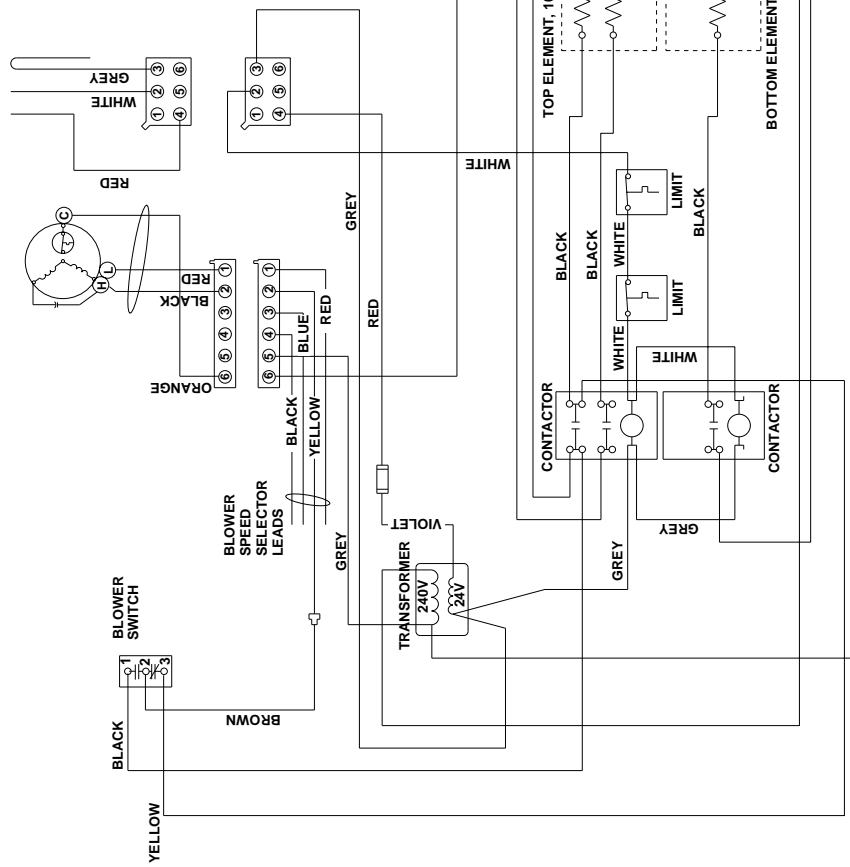
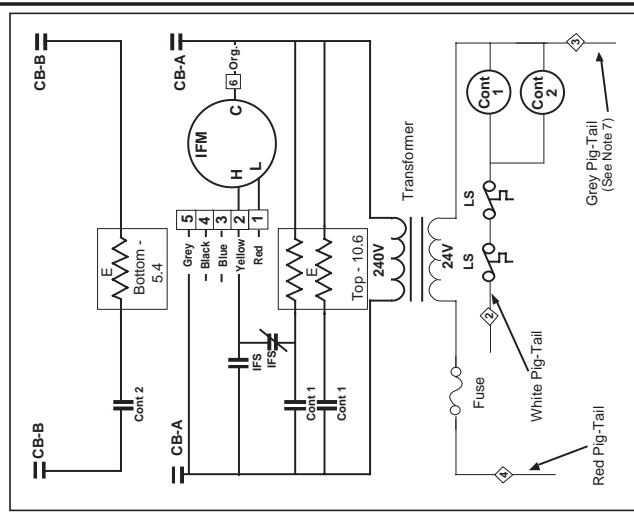
Legend:
 CB – Circuit Breaker
 E – Heater Element
 IFS – Fan Switch
 Cont – Contactor
 LS – Limit Switch
 □ – Fan Plug
 ◇ – Control Plug
 IFM – Fan Motor

Figure 23. E2EH 012, 015 Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.6 Amps.
- 3) To change blower speed on units without a relay box refer to installation instructions.
- 4) Refer to furnace and/or relay box installation 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) This wire is used with some accessories. See accessory Installation Instructions for further details.

WARNING:
Switch circuit breakers to the OFF position before servicing the furnace.

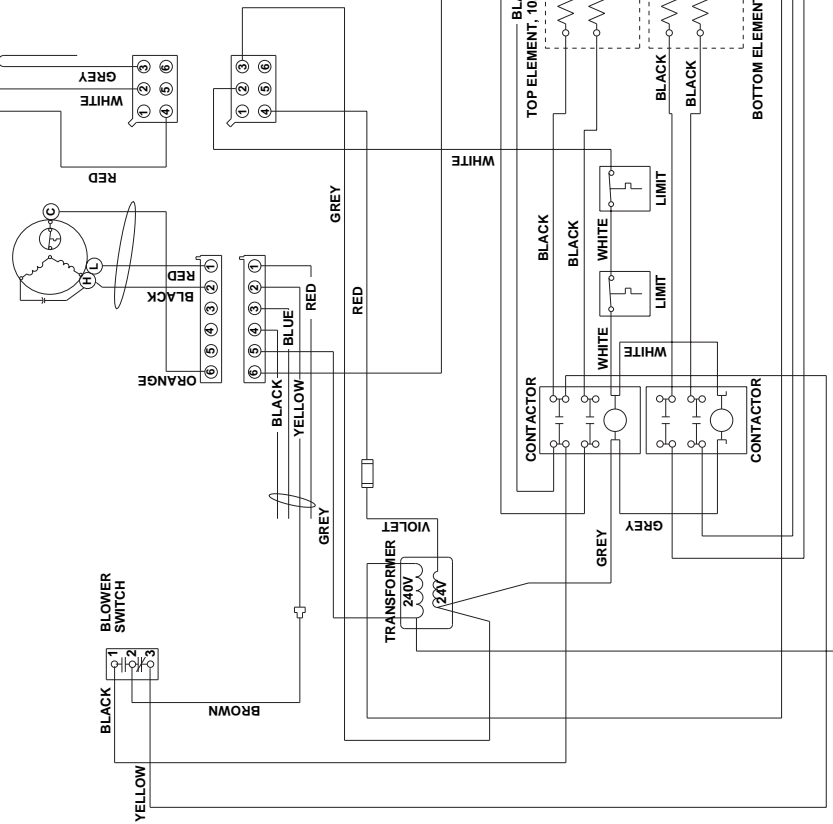


Legend:
 CB – Circuit Breaker
 E – Heater Element
 IFS – Fan Switch
 Cont – Contactor
 LS – Limit Switch
 □ – Fan Plug
 ◇ – Control Plug
 IFM – Fan Motor

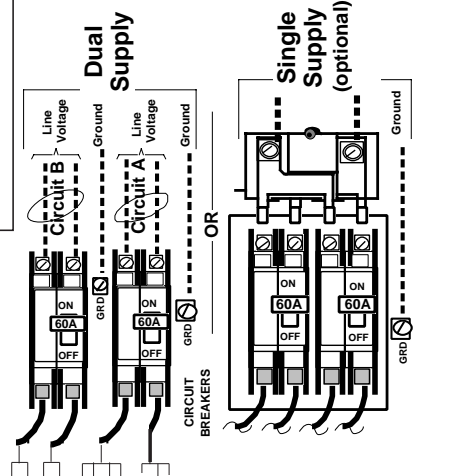
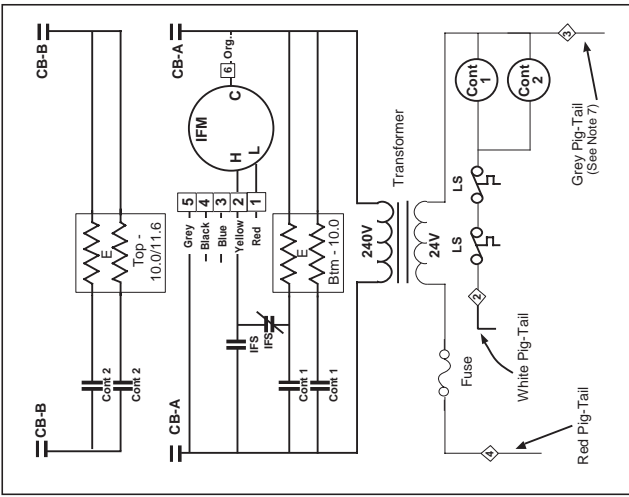
Figure 24. E2EH 017, E2EH 015 HR Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.6 Amps.
- 3) To change blower speed on units without a relay box refer to installation instructions.
- 4) Refer to furnace and/or relay box installation 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) This wire is used with some accessories. See accessory Installation Instructions for further details.



WARNING:
Switch circuit breakers to the OFF position before servicing the furnace.

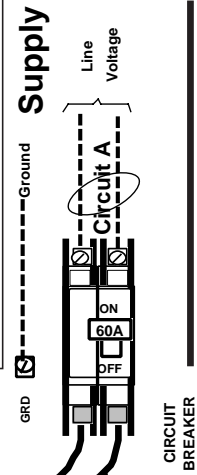
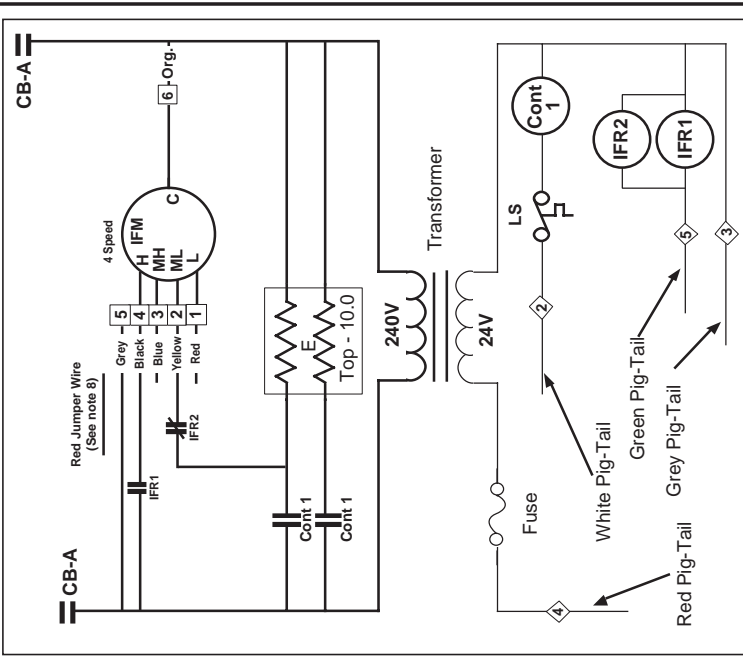
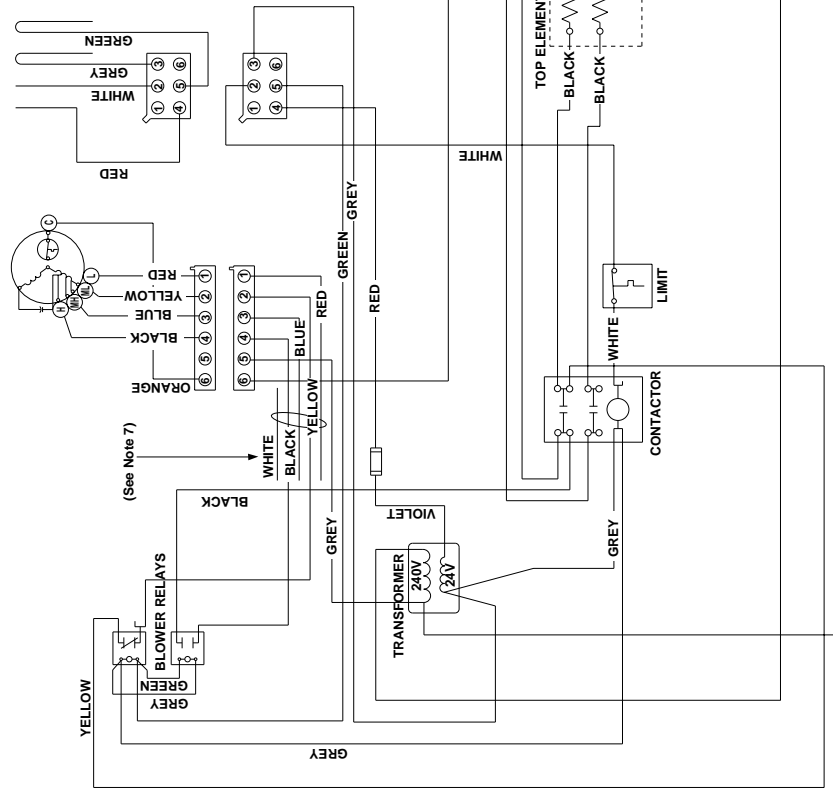


Legend:
 CB – Circuit Breaker
 E – Heater Element
 IFS – Fan Switch
 Cont – Contactor
 LS – Limit Switch
 □ – Fan Plug
 ◇ – Control Plug
 IFM – Fan Motor

Figure 25. E2EH 020, 023 Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.50 Amps.
- 3) To change blower speed on units without a relay box refer to installation instructions.
- 4) Refer to furnace and/or relay box installation 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) This wire is used with some accessories. See accessory Installation Instructions for further details.



WARNING:
 Switch circuit breakers to the OFF position before servicing the furnace.

Legend:

CB	– Circuit Breaker
E	– Heater Element
IFR	– Fan Relay
Cont	– Contactor
LS	– Limit Switch
□	– Fan Plug
◇	– Control Plug
IFM	– Fan Motor

Figure 26. E2EB 010 Wiring Diagrams

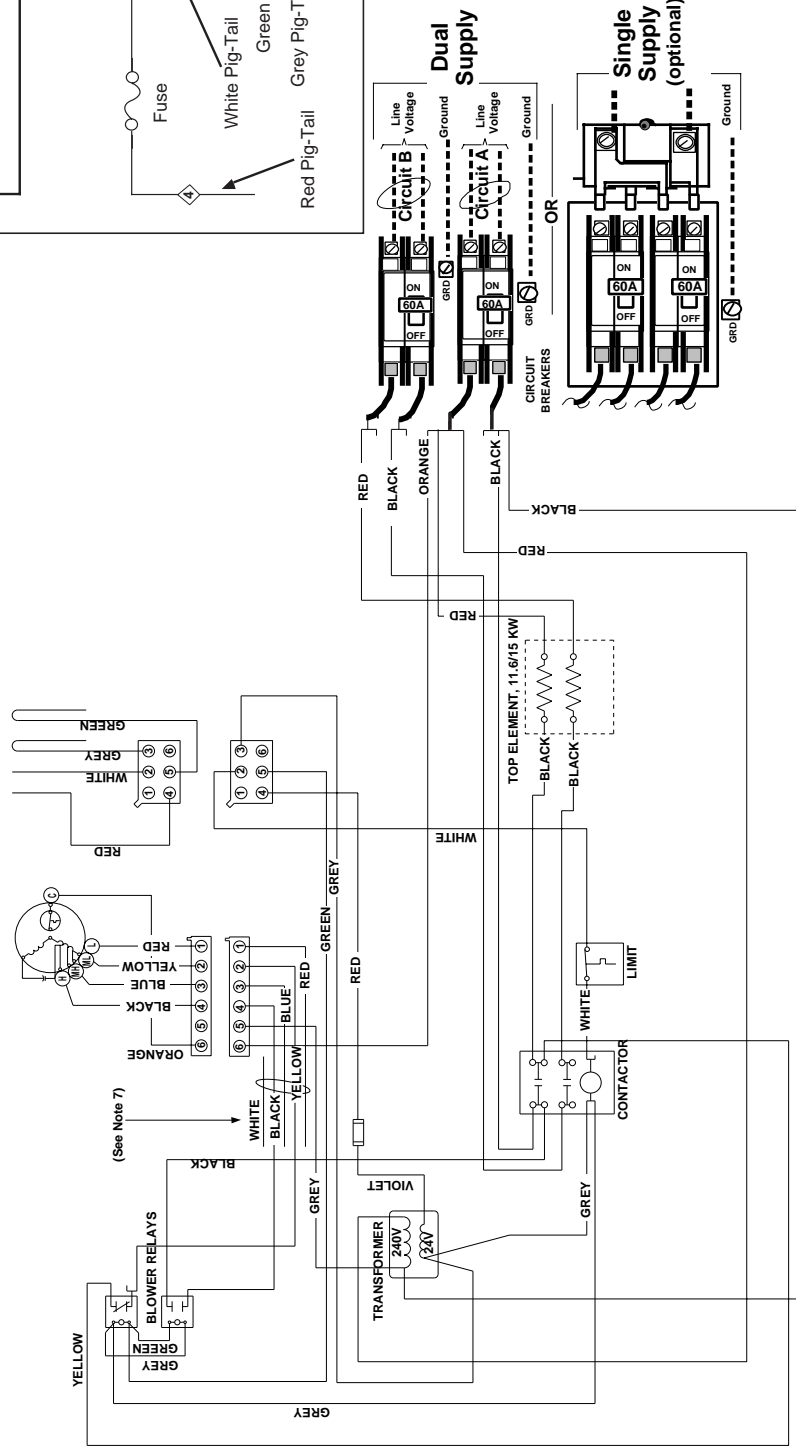
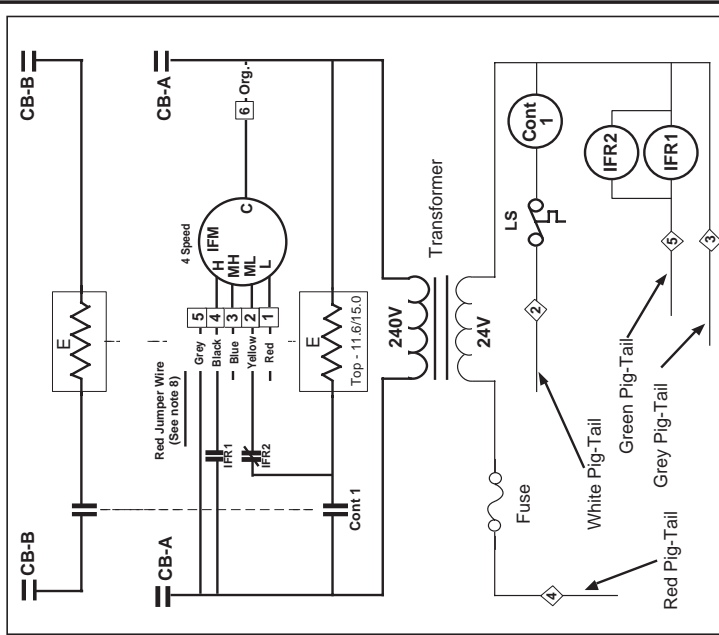
NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.50 Amps.
- 3) To change blower speed on units without a relay box refer to installation instructions.
- 4) Refer to furnace and/or relay box installation 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) This wire is used with some accessories. See accessory Installation Instructions for further details.

Legend:

- CB – Circuit Breaker
- LS – Limit Switch
- E – Heater Element
- IFR – Fan Relay
- Cont – Contactor
- IFM – Fan Motor



WARNING:
Switch circuit breakers to the OFF position before servicing the furnace.

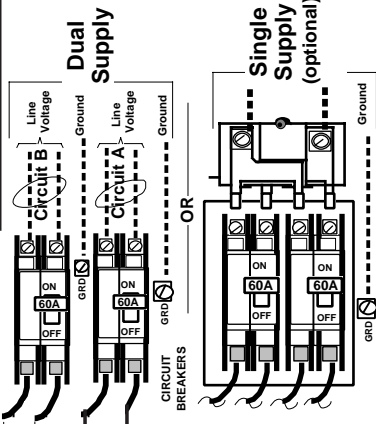
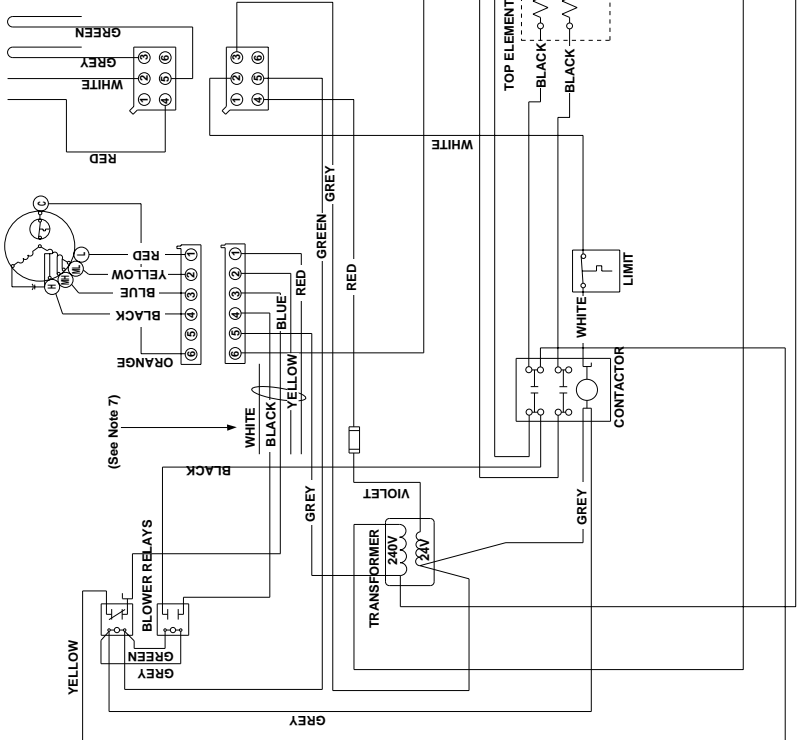
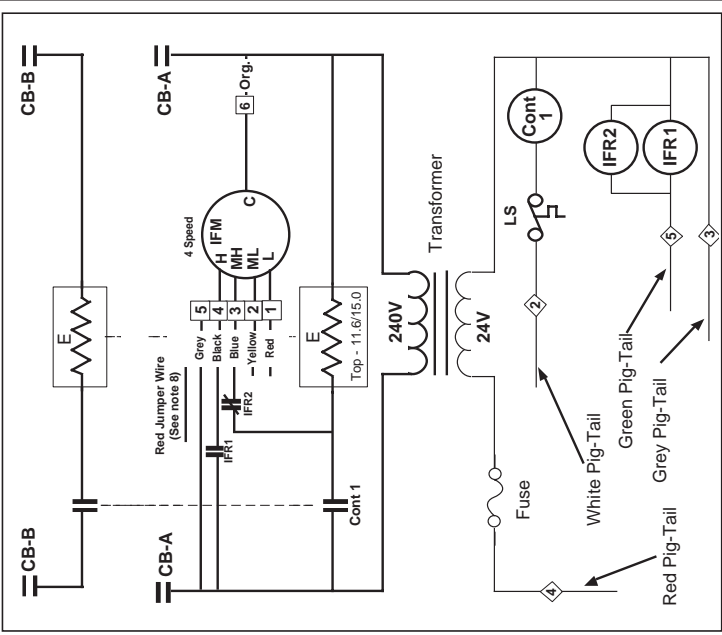
Figure 27. E2EB 012 Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.50 Amps.
- 3) To change blower speed on units without a relay box refer to installation instructions.
- 4) Refer to furnace and/or relay box installation 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) This wire is used with some accessories. See accessory Installation Instructions for further details.

Legend:

- CB – Circuit Breaker
- E – Heater Element
- IFR – Fan Relay
- Cont – Contactor
- LS – Limit Switch
- – Fan Plug
- ◇ – Control Plug
- IFM – Fan Motor



WARNING:
Switch circuit breakers to the OFF position before servicing the furnace.

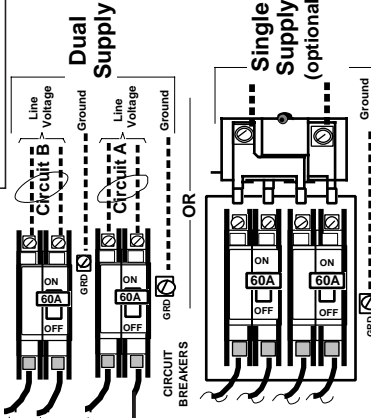
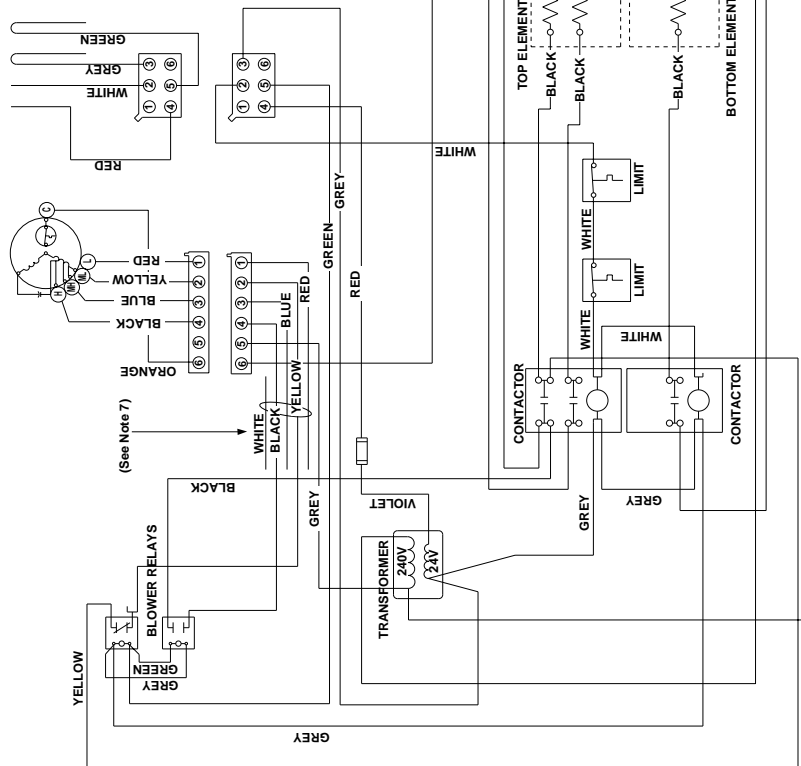
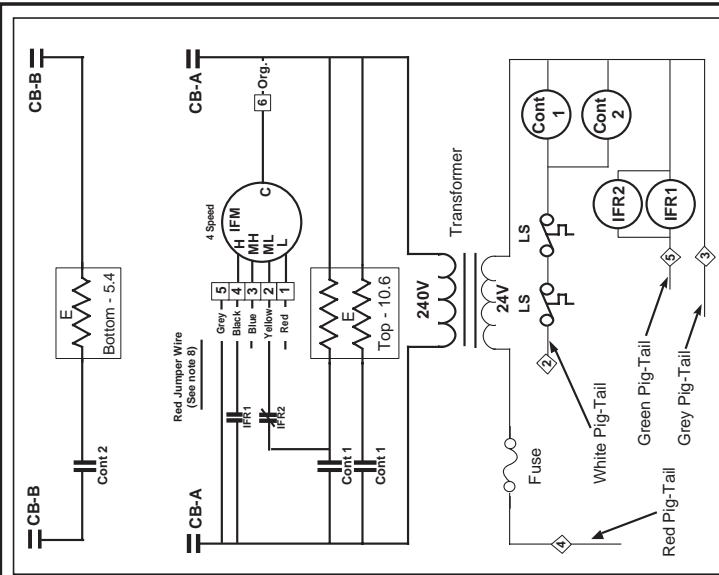
Figure 28. E2EB 015 Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.75 Amps.
- 3) To change blower speed on units without a relay box refer to installation instructions.
- 4) Refer to furnace and/or relay box installation 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) This wire is used with some accessories. See accessory Installation Instructions for further details.

Legend:

- CB – Circuit Breaker
- E – Heater Element
- IFR – Fan Relay
- Cont – Contactor
- LS – Limit Switch
- – Fan Plug
- ◇ – Control Plug
- IFM – Fan Motor



! WARNING:
Switch circuit breakers to the OFF position before servicing the furnace.

Figure 29. E2EB 017, E2EB 015 HR Wiring Diagrams

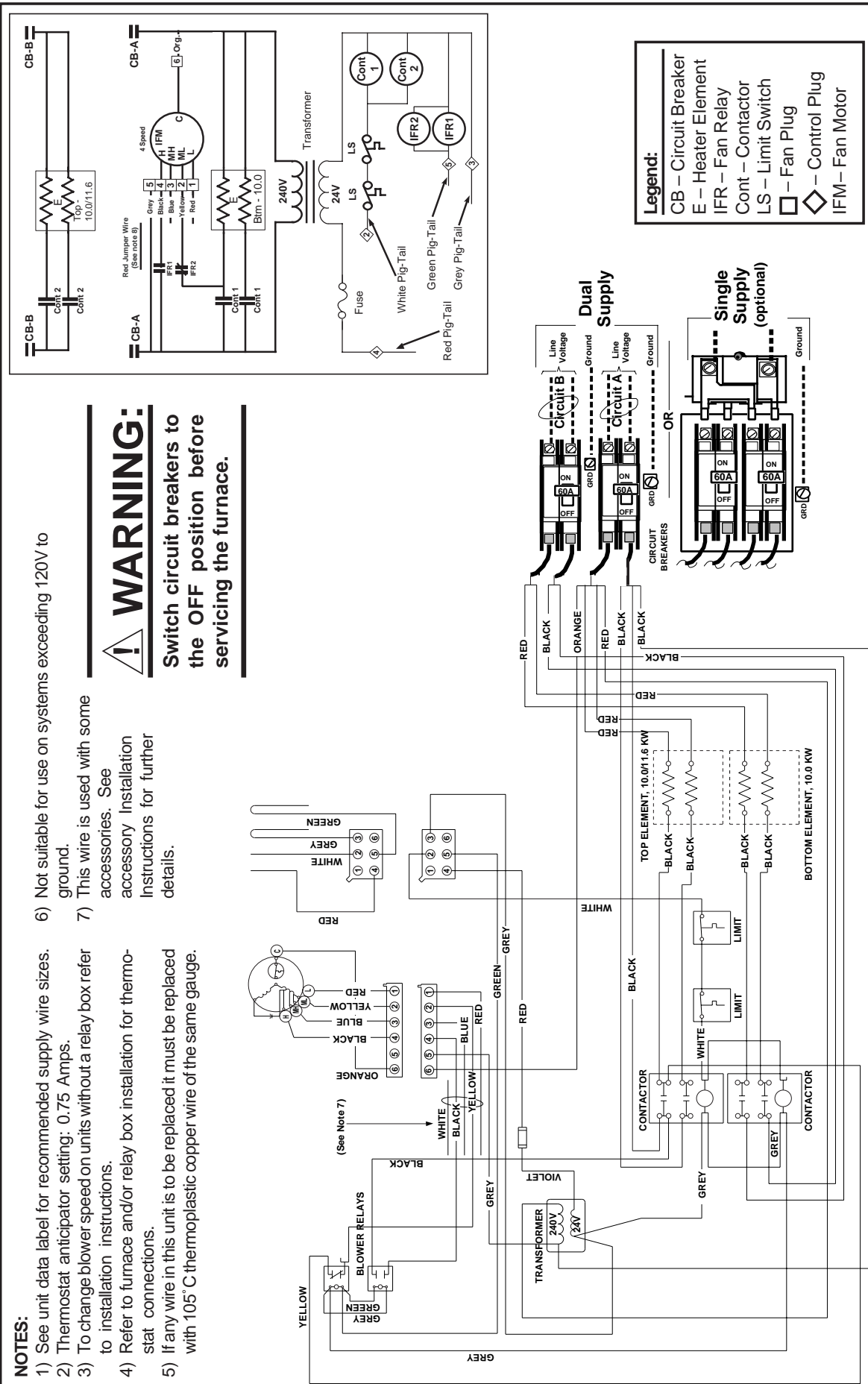


Figure 30. E2EB 020, 023, and 023 - 5 Ton Wiring Diagrams

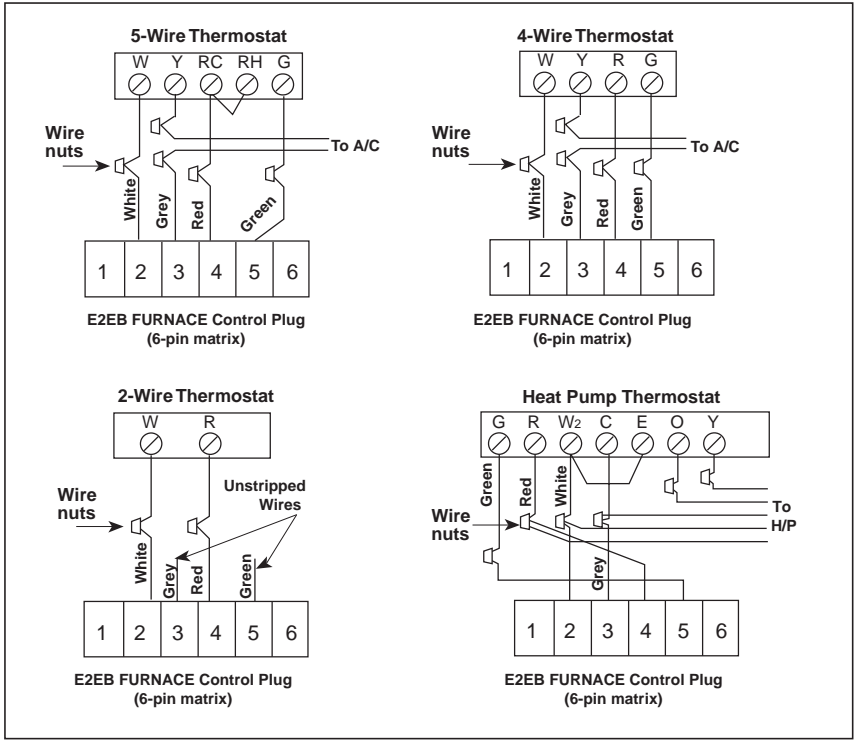


Figure 31. E2EB Thermostat Connection

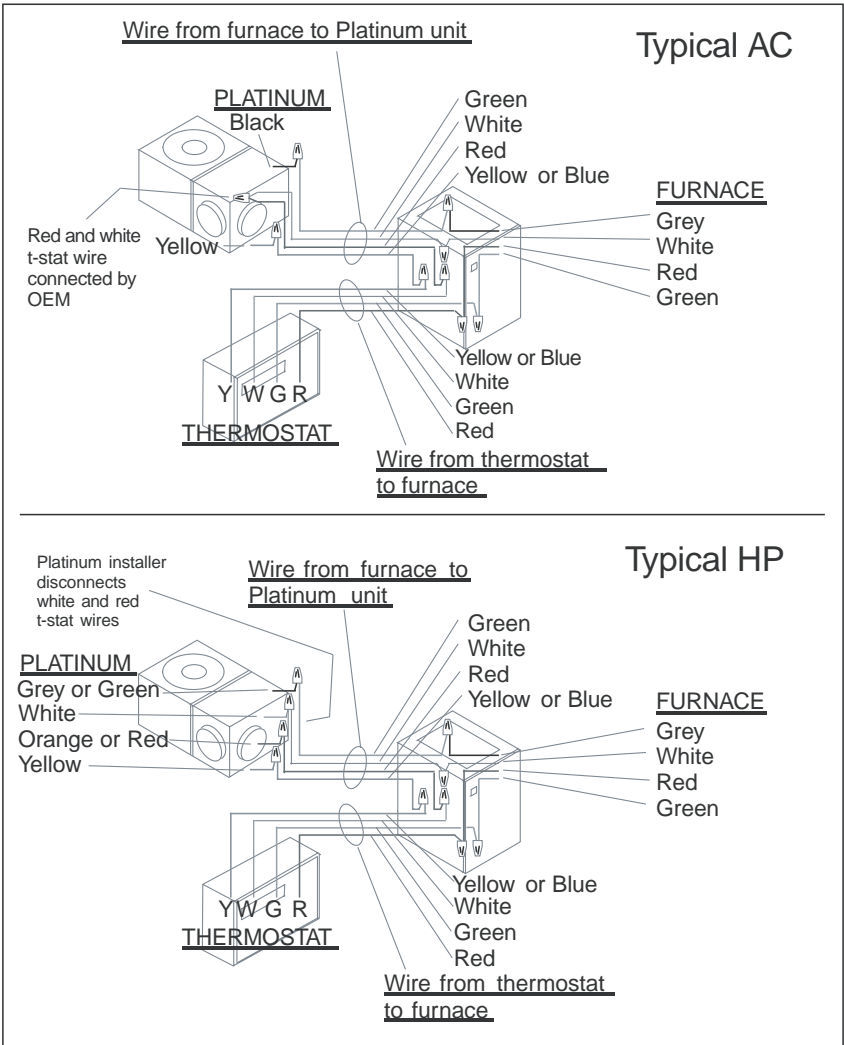


Figure 32. E2 Furnace Low Voltage Wiring if Installed with Platinum Series Models

Furnace Inspection Report

		Please Write In Appropriate Response		
		Circuit A	Circuit B	
Electrical Wiring (If single circuit, write "N/A" in circuit B)				
Breaker Size?				
Furnace Wire Size?				
Thermostat Wire Size?				
		Please Circle Appropriate Response		
Electrical				
Is the furnace grounded properly?		Yes	No	N/A
Is wiring routed safely with approved connectors?		Yes	No	N/A
Closet Installation				
Is front clearance a minimum of 6 inches?		Yes	No	N/A
Is return air opening a minimum of 235 sq. inches?		Yes	No	N/A
Is front clearance less than 6 inches (minimum of 1 inch)?		Yes	No	N/A
Is return air opening a minimum of 250 sq. inches?		Yes	No	N/A
Does the furnace have the 5-ton AC coil installed?		Yes	No	N/A
Is the return air opening a minimum of 390 sq inches?		Yes	No	N/A
Plenum (Base) Connector				
Is mounting plate secured properly?		Yes	No	N/A
Is furnace locked and secured in front?		Yes	No	N/A
Is plenum free of debris?		Yes	No	N/A
Has plenum opening been reduced in size to accommodate offset?		Yes	No	N/A
Has plenum spacer been removed if duct size is large enough?		Yes	No	N/A
Testing				
Is someone in the plant trained to perform duct tests?		Yes	No	N/A
VentilAire III ___ IV ___				
Is VentilAire duct connected properly to furnace?		Yes	No	N/A
Is depressurization vent (if required) installed properly?		Yes	No	N/A
Is roof assembly installed properly?		Yes	No	N/A
Is roof assembly a minimum of 3 inches from any other vents?		Yes	No	N/A
General				
Is filter in place?		Yes	No	N/A
Is owner's packet included?		Yes	No	N/A
Checked storage area for damage to product and proper storage?		Yes	No	N/A
Is installation in accordance with installation instructions?		Yes	No	N/A
Comments				

INSTALLER: Do Not Discard These Instructions
 After completing the installation, return these instructions
 to the Homeowner's Package for owner-user's future reference.
Complies with H.U.D. Manufactured Home Construction & Safety Standards.



708172A

708172A (Replaces 7082360)