

Downflow, Upflow Electric Furnaces

Owners Manual/Installation Instructions

E2 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:

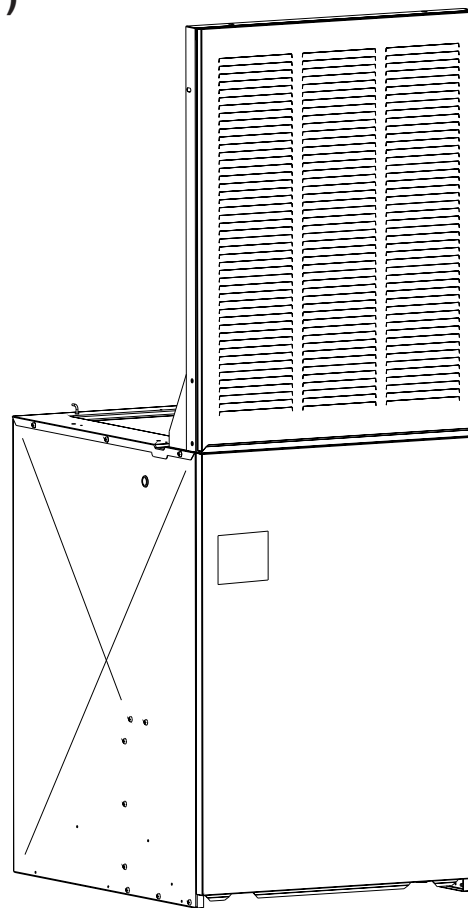
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage, or death. Refer to this manual. For assistance or additional information consult 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.

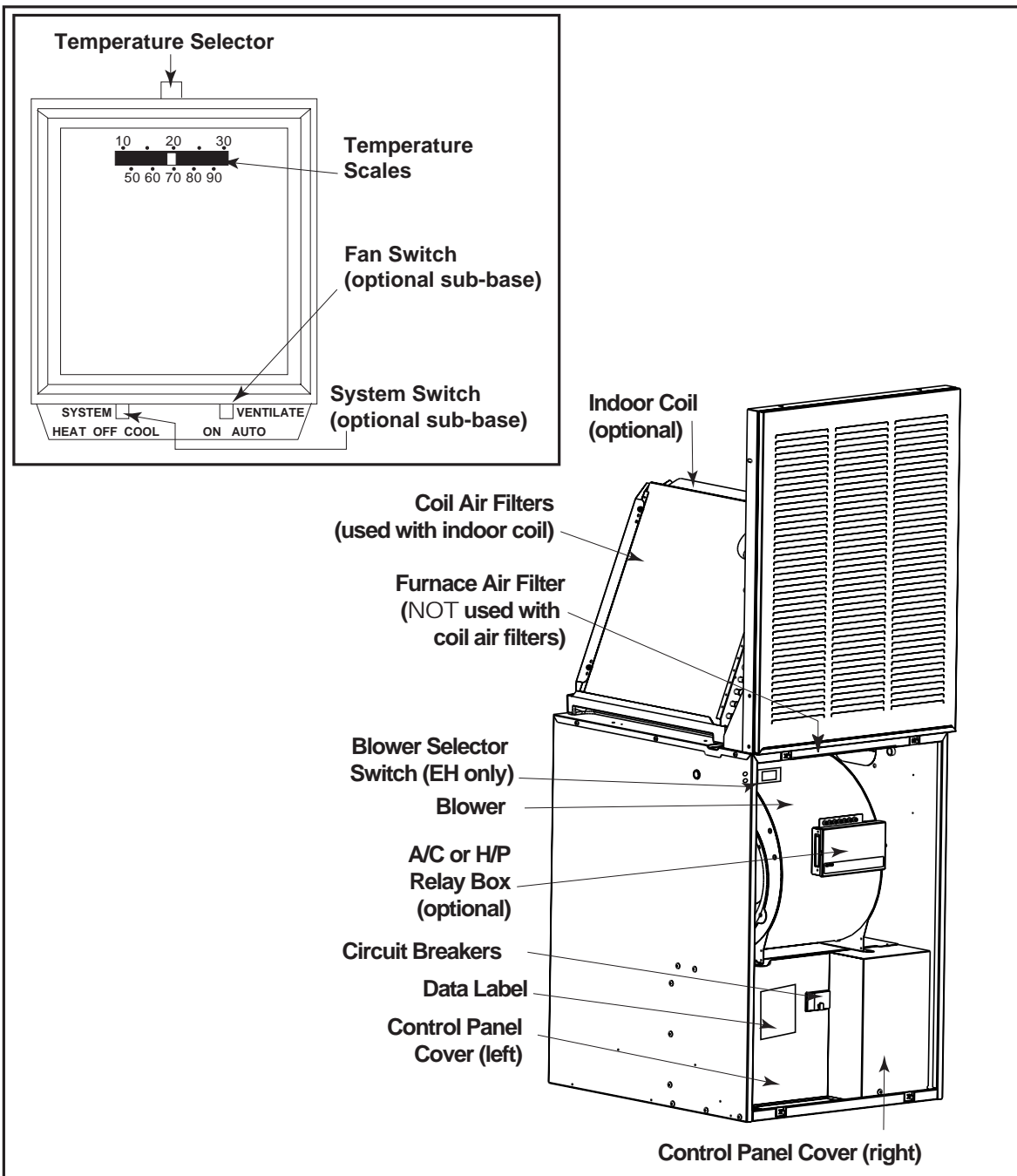
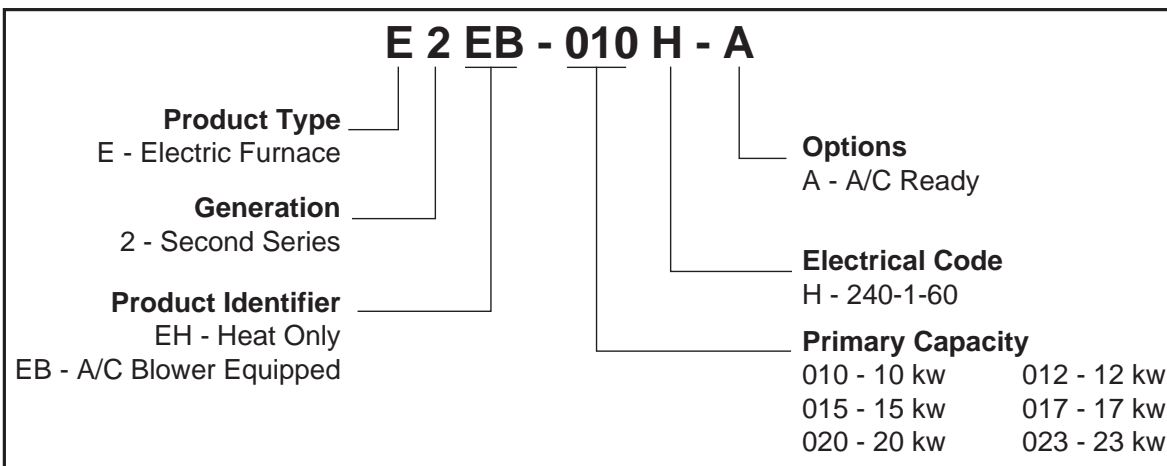


Figure 1. Furnace Parts Identification



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, Item 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, Item 2) 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, Item 2) 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, Item 1) at any time.

Please specify the complete model and serial numbers shown on the furnace data label (see Figure 1, Item 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.* 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 grilled 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

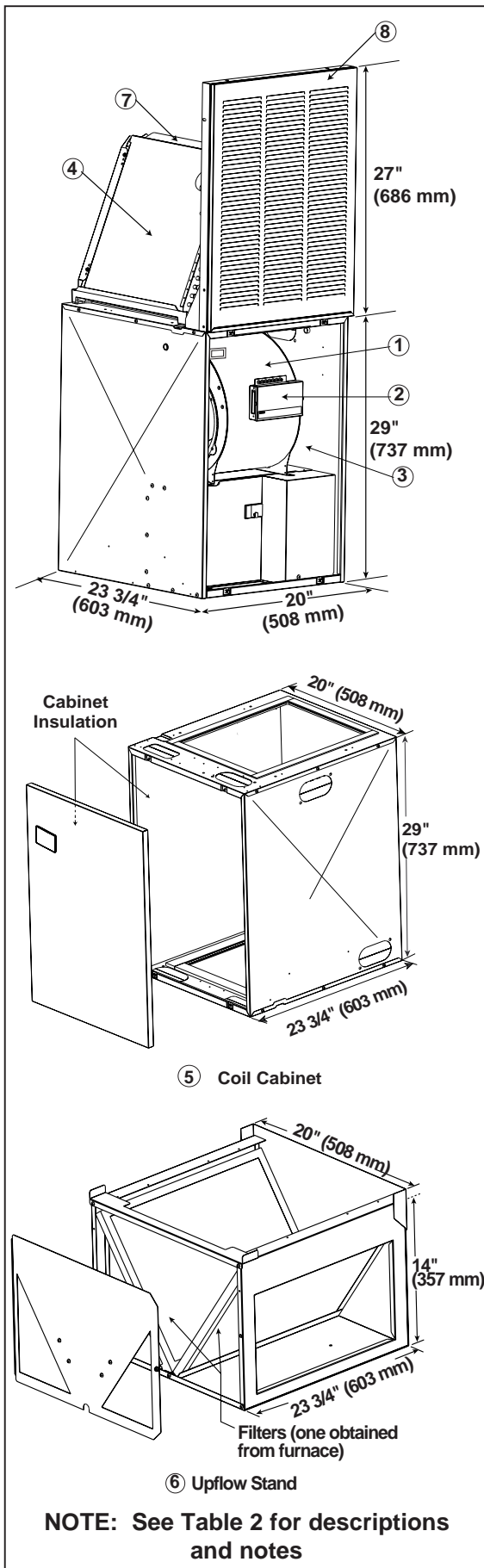
A return air grille and frame assembly (see Figure 2) is available for use in non-ducted return air installations. In downflow alcove installations, the grille and frame assembly may be mounted directly to the top of the furnace. In closet installations, a wall mount grille is available for attachment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



NOTE: See Table 2 for descriptions and notes

Figure 2. Optional Accessories

Item Number (See Fig. 1)	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

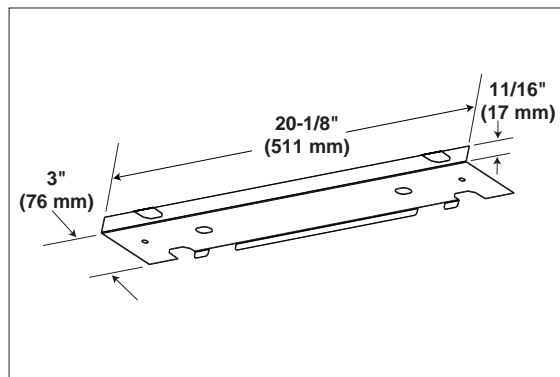


Figure 3. Optional Rear Mounting Plate (P/N 389080)

Electric Furnace Models	E2EH						E2EB						
	010H	012H	015H	017H	020H	023H	010H	012H	015H	017H	020H	023H	023H 5 Ton
Rated Heating Output, Btuh (see note1)	35,000	41,000	53,000	57,000	70,000	75,000	35,000	41,000	53,000	57,000	70,000	75,000	75,000
Watts (Total kw, Heating Elements and Blower)	10.4	12.0	15.4	16.6	20.4	22.0	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)	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" Wide						10.5" Dia., 8" Wide						11" Dia., 8" W
Motor Speeds, H.P. Rating, Amps	2 Speed, 1/5 Hp, 2.0 Amps						4 Speed, 1/3 Hp, 2.9 Amps						4 Spd, 3/4 Hp, 3.8 Amps
Test ESP, in. w.c. Max	0.3												
Optional Cooling Available with factory installed blower	2.0 - 3.0 ton (see note 3)						2.0 - 4.0 ton (see note 4)						2.0 - 5.0 Ton
Optional Heat Pump Available with factory installed blower	2.0 - 3.0 ton (see note 3)				n/a (see note 3)		2.0 - 4.0 ton (see note 4)						2.0 - 5.0 Ton
Air Filter (Standard)	16" x 20" x 1" (nominal)												
Furnace Dimensions	Width - 20" (508 mm) Height - 29" (737 mm) (see note 2) Depth - 24-1/2" (623 mm)												

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 EH models can be replaced with a multi-speed blower allowing the units to accept up to 4 or 5 tons of air conditioning or 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 or heat pump.

Table 3. Unit Specifications

If "X" floor cavity is:		Use Plenum Connector Model
English	Metric (mm)	Order No.
7/8"	22	901987
2"	51	901988
4 1/4"	108	901989
6 1/4"	159	901990
8 1/4"	210	901991
10 1/4"	260	901992
12 1/4"	311	901993

Table 4. Floor Cavity Sizes

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 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. Switch circuit breaker(s) to "ON", reinstall furnace front door, and turn on electrical supply circuits to the furnace.

Optional Plenum Connectors for Downflow Systems

Plenum 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. Also, the furnace rear mounting plate (see Figure 3) supplied with the plenum connectors is recommended for use with this type of installation.

SELECTING PLENUM CONNECTOR

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

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

TYPICAL INSTALLATION OF DOWNFLOW SYSTEMS

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. Plenum 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

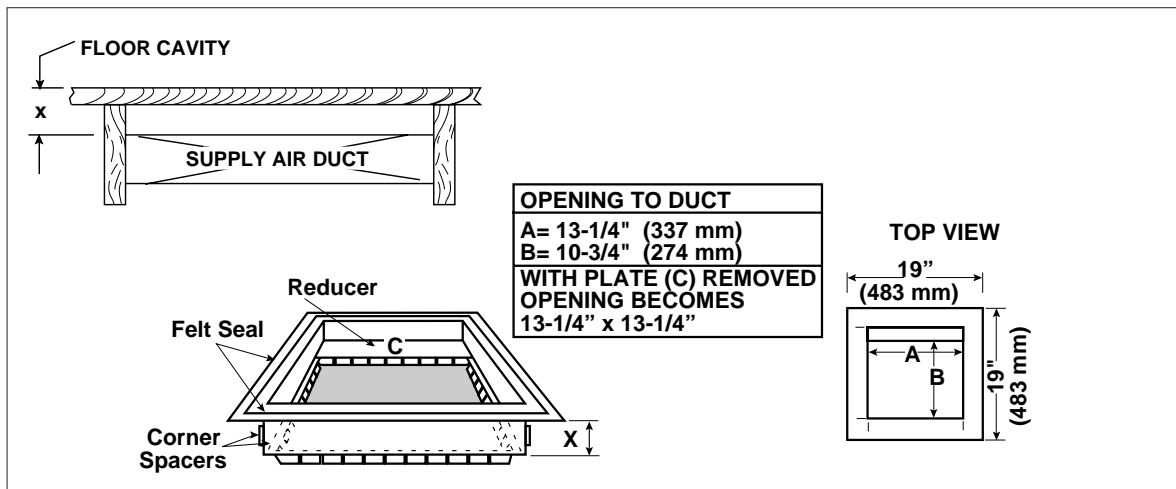


Figure 4. Plenum Connector Selection

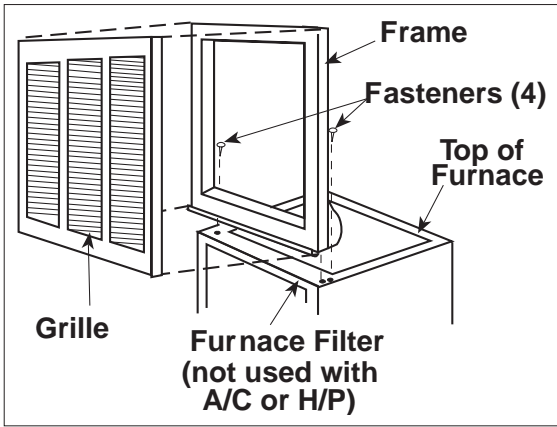


Figure 5. Grille Support Frame and Grille Assembly

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

1. 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 5).
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.
3. With optional coil housing:
 - see coil cabinet instructions for specific filtering methods.

Filtering Methods - Ducted Return Air

1. 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.
2. 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.

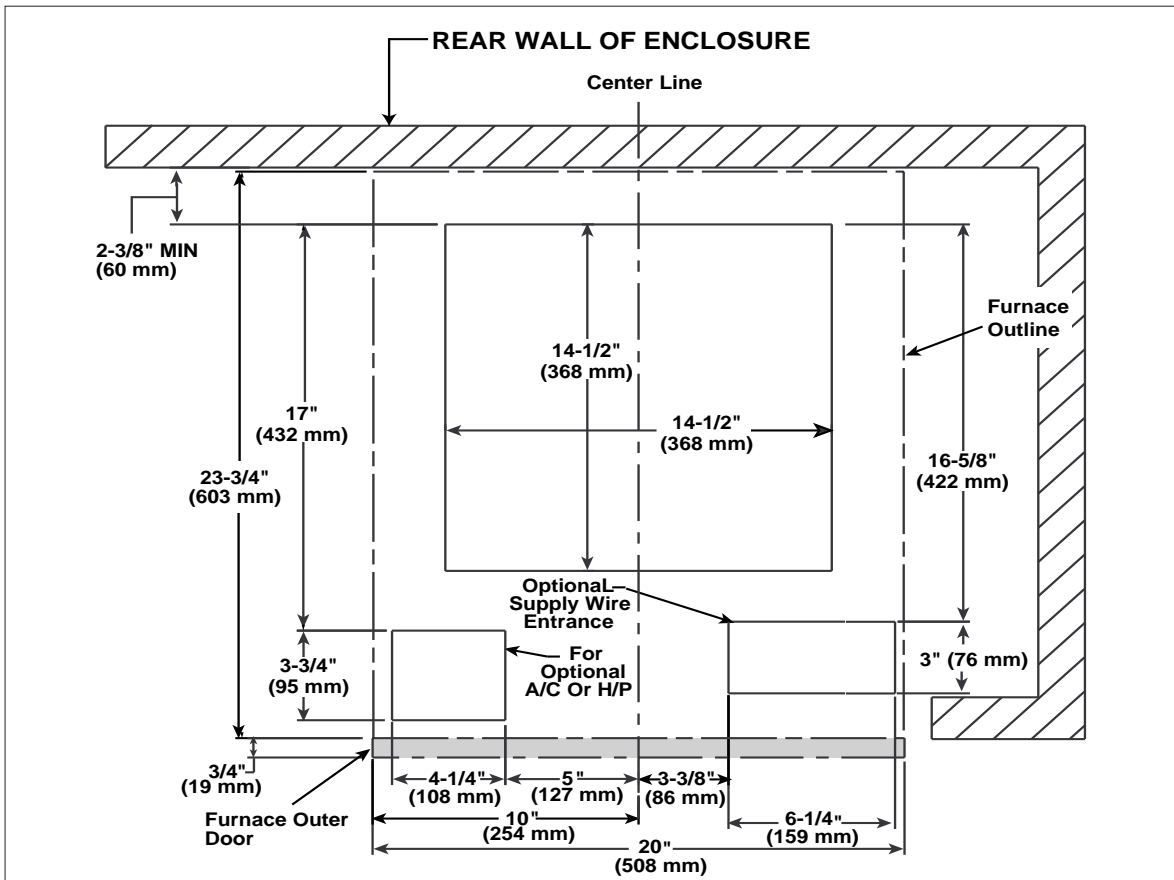


Figure 6. Downflow Floor Cutout Locations (nominal dimensions)

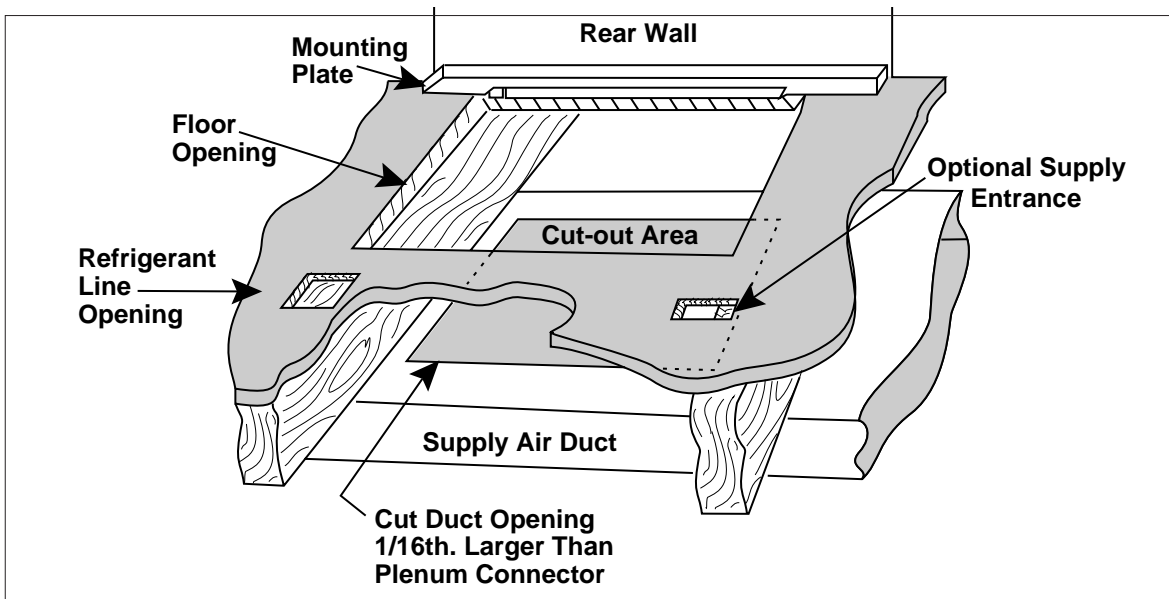


Figure 7. Rear Mounting Plate

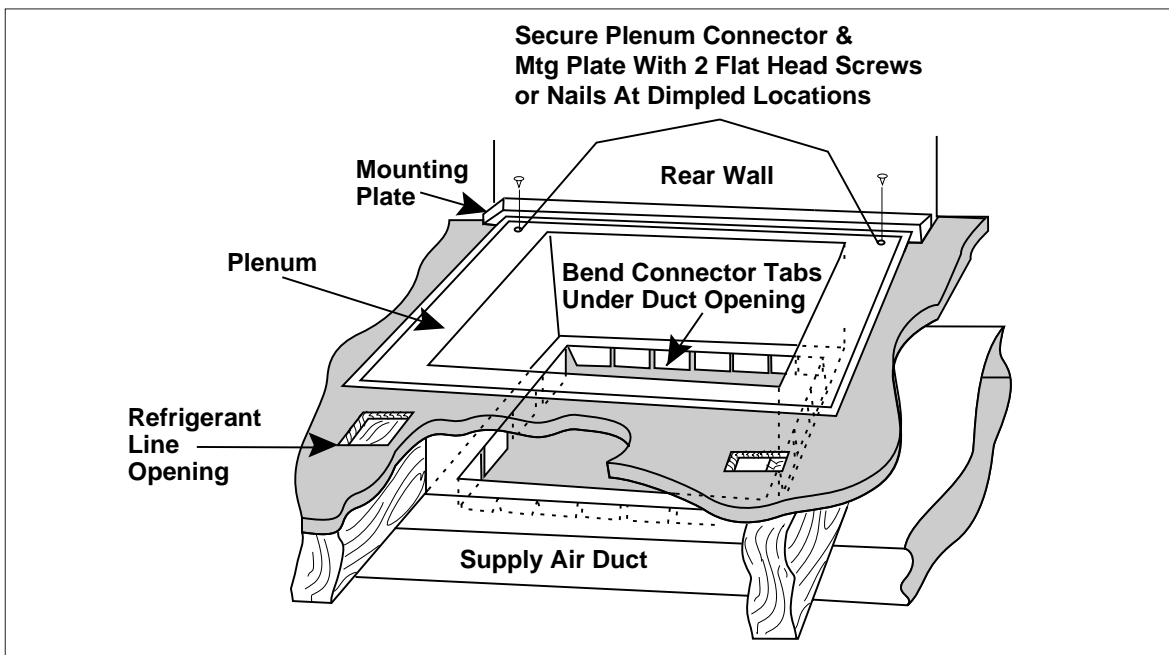


Figure 8. Plenum Connector

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 $\pm 1/2"$.

Installing Plenum Connector

NOTE: The plenum connector is designed for use on ducts down to 12" wide. On typical ducts, the plenum connector may be installed using Method A. On narrow ducts, there may be insufficient clearance to bend the tabs on two sides of the plenum connector. In such cases, use Method B or C.

Method A

1. Place plenum connector through floor opening with bottom tabs resting on top of supply air duct. Mark cutout area around inside of tabs.
2. Remove plenum connector and cut out duct opening slightly larger than area marked.

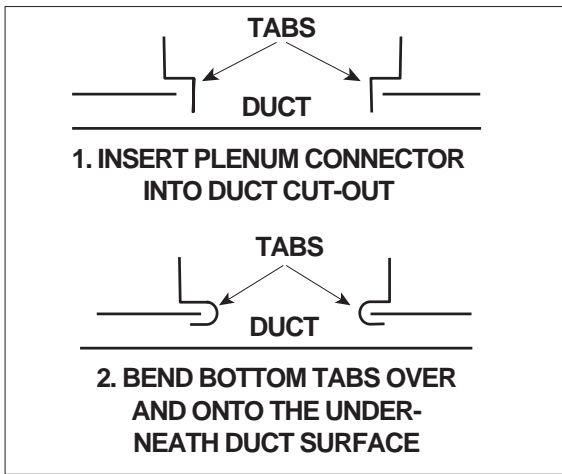


Figure 9. Plenum Connector Installation A

3. If using optional rear mounting plate (supplied with plenum connector), install it to back edge of floor opening (see Figure 7). Reinstall plenum connector in floor opening. A shim may be used, if necessary, to ensure the furnace is level.
4. Secure plenum 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 9).

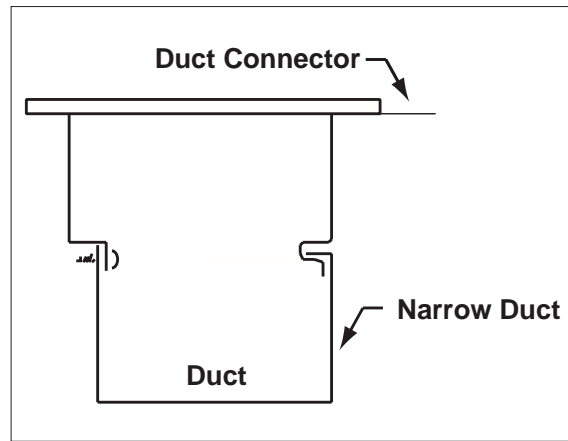


Figure 10. Alternate Plenum Connector Installation B

Method B

1. Attach tabs to sides of duct (one on each side) using sheet metal fasteners or other method, ensuring that the plenum is secure and sealed to the duct (see Figure 10).
2. Tape duct flap edges with an approved tape for a leak-free joint.

Method C

1. Score and cut top of metal duct as indicated in Figure 11, Step 1 or Step 2. If using Step 1, also cut out metal from the shaded area "A".
2. Fold the duct flap "B" up (see Figure 11, Step 3).
3. At the front-to-back of duct run (see Figure

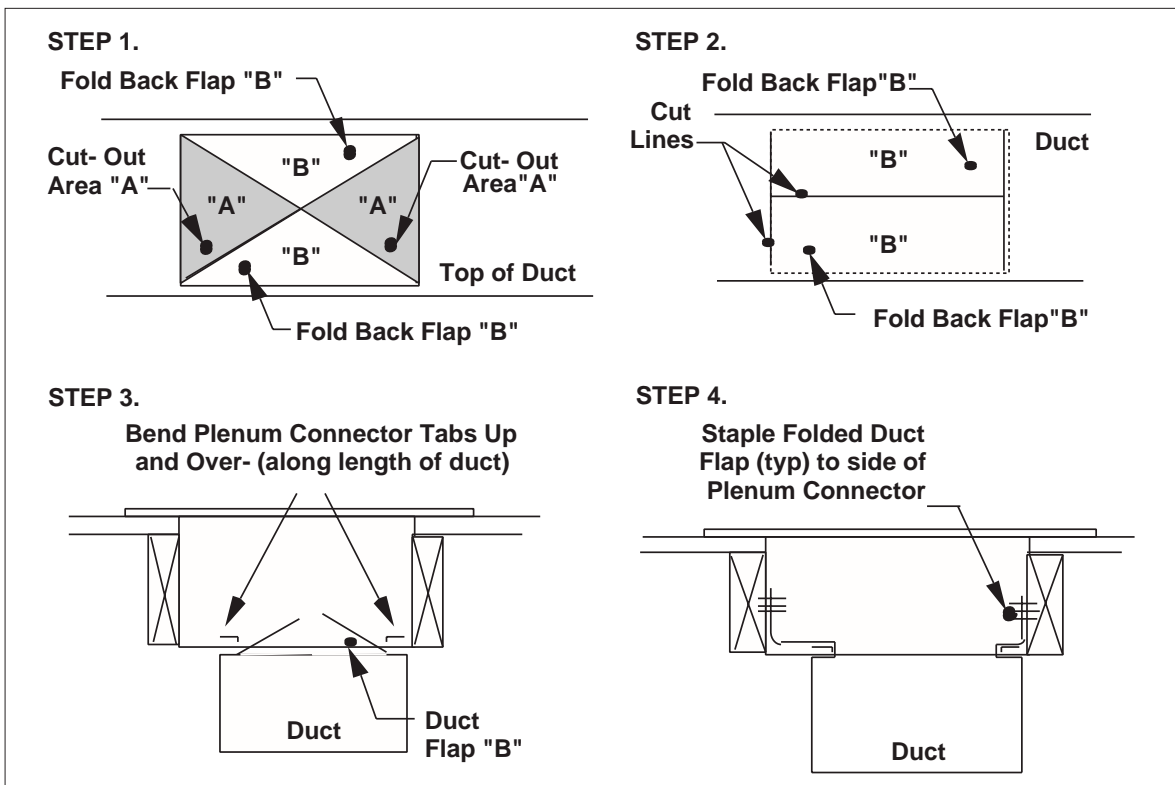


Figure 11. Alternate Plenum Connector Installation C

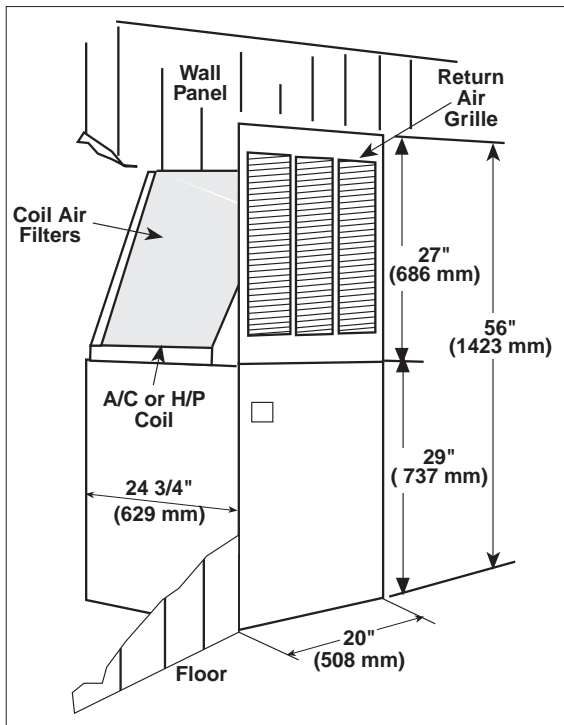


Figure 12. Typical Alcove Installation

11. area "A", bend the plenum tabs and secure them directly to the duct.
4. At area "B", bend the plenum tabs up and back over, around the plenum connector (see Figure 11, step 3).
5. Fold/form the duct flap against the side of the plenum connector and attach as shown (see Figure 11, 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. Tape the duct flap edges with an approved tape for a leak-free joint.

Alcove Installation

1. Cut alcove rough openings to minimum dimensions shown in Figure 12.
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.
4. Attach return air grille to frame assembly by hooking grille over flange on top of frame and into channel on bottom.

Closet Installation

NOTE: For closet installations, the return air grille mounting frame is not used since the furnace is located inside the closet (see Figure 13).

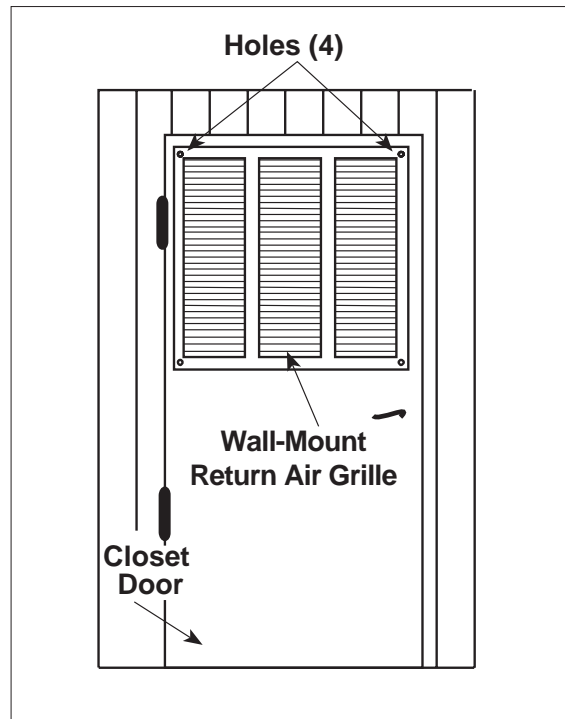


Figure 13. Typical Closet Installation

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 14 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 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 front to back and right to left.

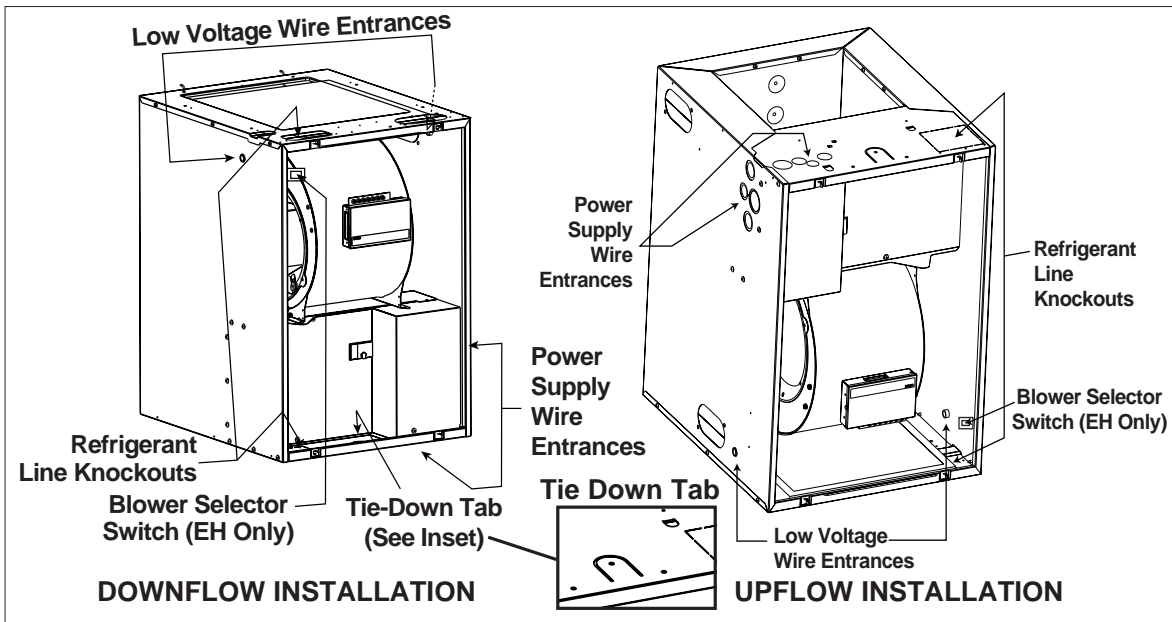


Figure 14. Downflow and Upflow Installations

4. Secure front of unit with one or more fasteners at mounting hole(s) provided or at tie-down tab (see Figure 14).
5. 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.

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 16) -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 15) -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.

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 16). Ensure that return air passage has no openings through supporting structure that would permit flame or hot gases to travel from space below up into space above supporting structure.
2. Use optional upflow stand with filters or construct a suitably braced mounting platform in closet (see Figure 15 or 16).
3. Install 240V supply circuit(s) and 24V wiring to closet (see Figure 14 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 15)
7. Install return air grille in closet preferably at same level as upflow stand or below mounting platform (see Figure 16).

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 17. 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. Ensure that return air passage has no openings through supporting structure that would permit flame or hot gases to travel from space below up into space above supporting structure.

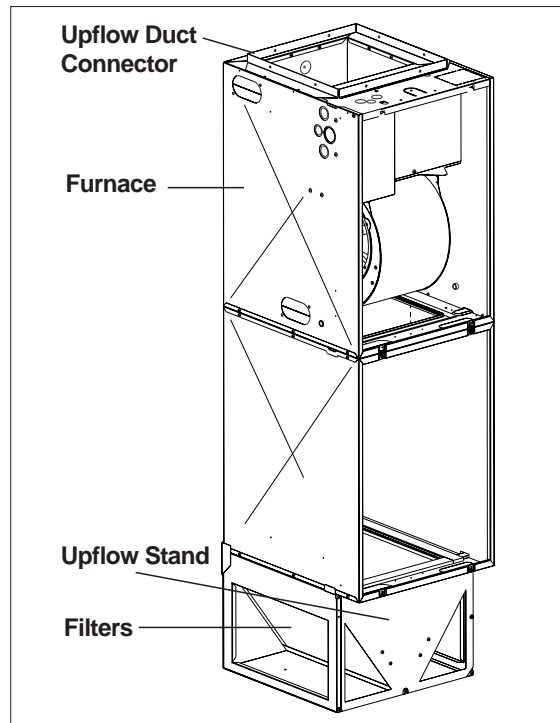


Figure 15. Over-the-Floor Return Air System with Upflow Stand

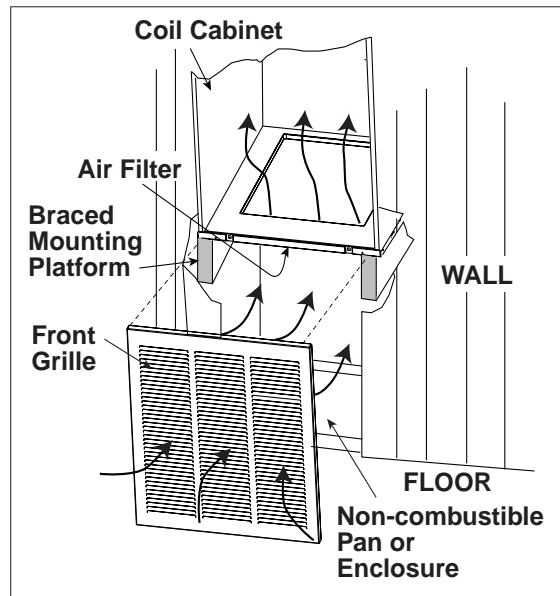


Figure 16. Over-the-Floor Return Air System

3. Install 240V supply circuit(s) and 24V wiring to closet (see Figure 14 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 15).

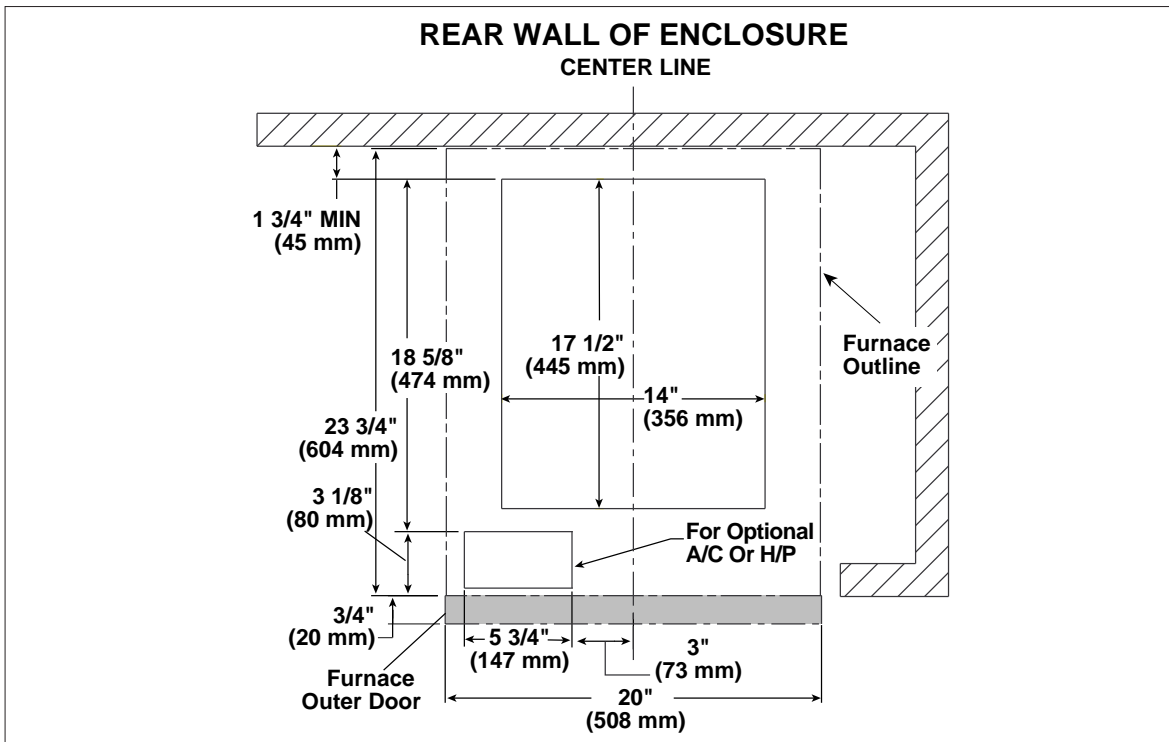


Figure 17. Upflow Floor Cutout Locations (nominal dimensions)

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 6 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 18 and 19).

- -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 18 and 19).
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.

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.

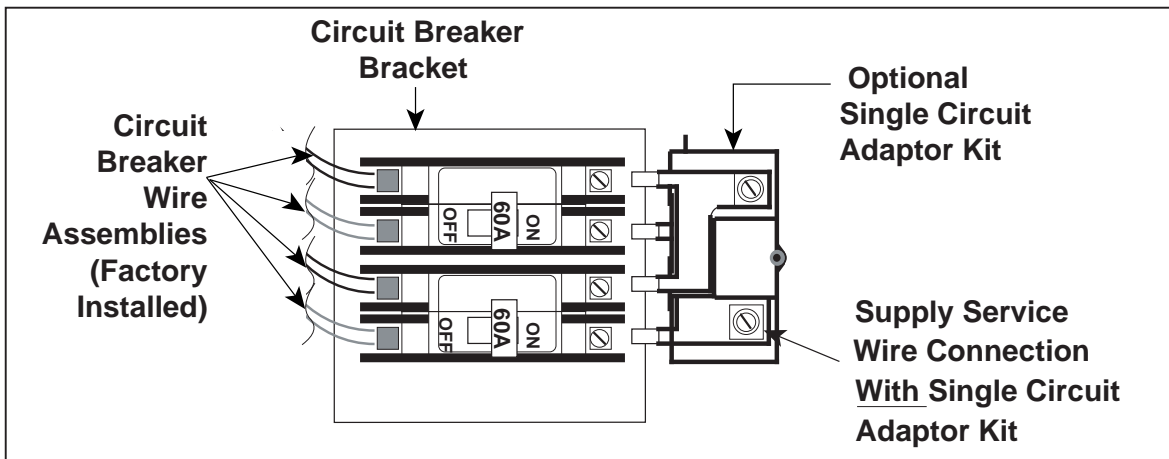


Figure 18. Installation of Optional Single Circuit Adaptor Kit

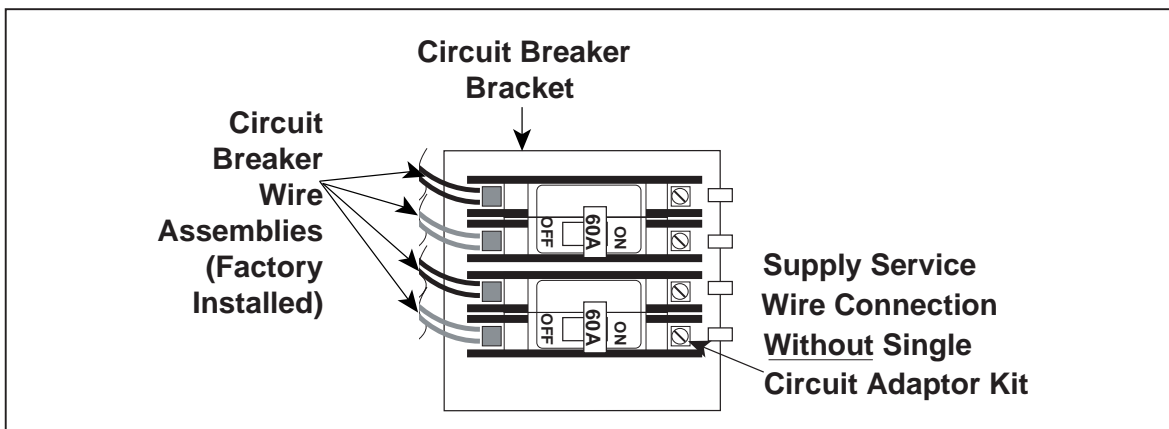


Figure 19. Installation of Supply Service Wires

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 terminal 6 on blower relay. The selected cooling blower lead is attached to terminal 4 on blower relay.

- a. Remove heating blower lead from terminal 6 on blower relay.
- b. Choose desired speed and install new blower lead onto terminal 6 of blower relay for new heating speed.
- c. Remove cooling blower lead from terminal 4 on blower relay.
- d. Install new blower lead onto terminal 4 of blower relay for new cooling speed.

See Table 7 for blower performance data.

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 the back cover of this manual for E2EB thermostat connections.

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 14) to "AUTO" (EH Units only).
6. Replace outer furnace door.
7. Check all duct connections and tape for air leakage.

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

Minimum approved speed for _____ 
010 and 012 models.


 Minimum approved speed for
015, 017, 020 and 023 models.

Table 5. Furnace Blower Speed Data

Model E2EH/ E2EB-	Supply Circuit		Total Amperes	Max Over- Current Rating	Min. Circuit Ampacity	Sizes*		Low-Voltage Thermostat Wire Size
						75°C Copper		
						Wire Size	Ground Size	
010	Single		45.5	60	57	6	10	2-Wire system max wire lengths : 24 Ga. = 55' 22 Ga. = 90' 20 Ga. = 140' 18 Ga. = 225' 4 or more-Wire system max wire lengths : 24 Ga. = 25' 22 Ga. = 45' 20 Ga. = 70' 18 Ga. = 110'
012	Single		52.1	70	65	6	8	
	Dual	"A"	28.0	40	35	8	10	
		"B"	24.2	30	30	10	10	
015	Single		66.3	90	83	4	8	
	Dual	"A"	45.5	60	57	6	10	
		"B"	20.8	30	26	10	10	
017	Single		71.3	90	89	3	8	
	Dual	"A"	48.8	60	61	6	10	
		"B"	22.5	30	28	10	10	
020	Single		87.1	125	109	2	6	
	Dual	"A"	45.5	60	57	6	10	
		"B"	41.7	60	52	6	10	
023	Single		93.8	125	117	1	6	
	Dual	"A"	45.5	60	57	6	10	
		"B"	48.3	60	60	6	10	

* All wire sizes for copper conductors only, based on NEC Table 310-16. Equivalent wiring may be used per NEC.

Table 6. Electrical Specifications

Standard 2-Speed Blower, with filter, @ 0.3" ESP		
Pin No.	Speed	CFM
#1	Low	840
#2	High	1160
4-Ton Blower with Coil and Coil 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

Furnace Model	Thermostat Anticipator Setting
010, 012	0.20
015, 017, 020, 023	0.40

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

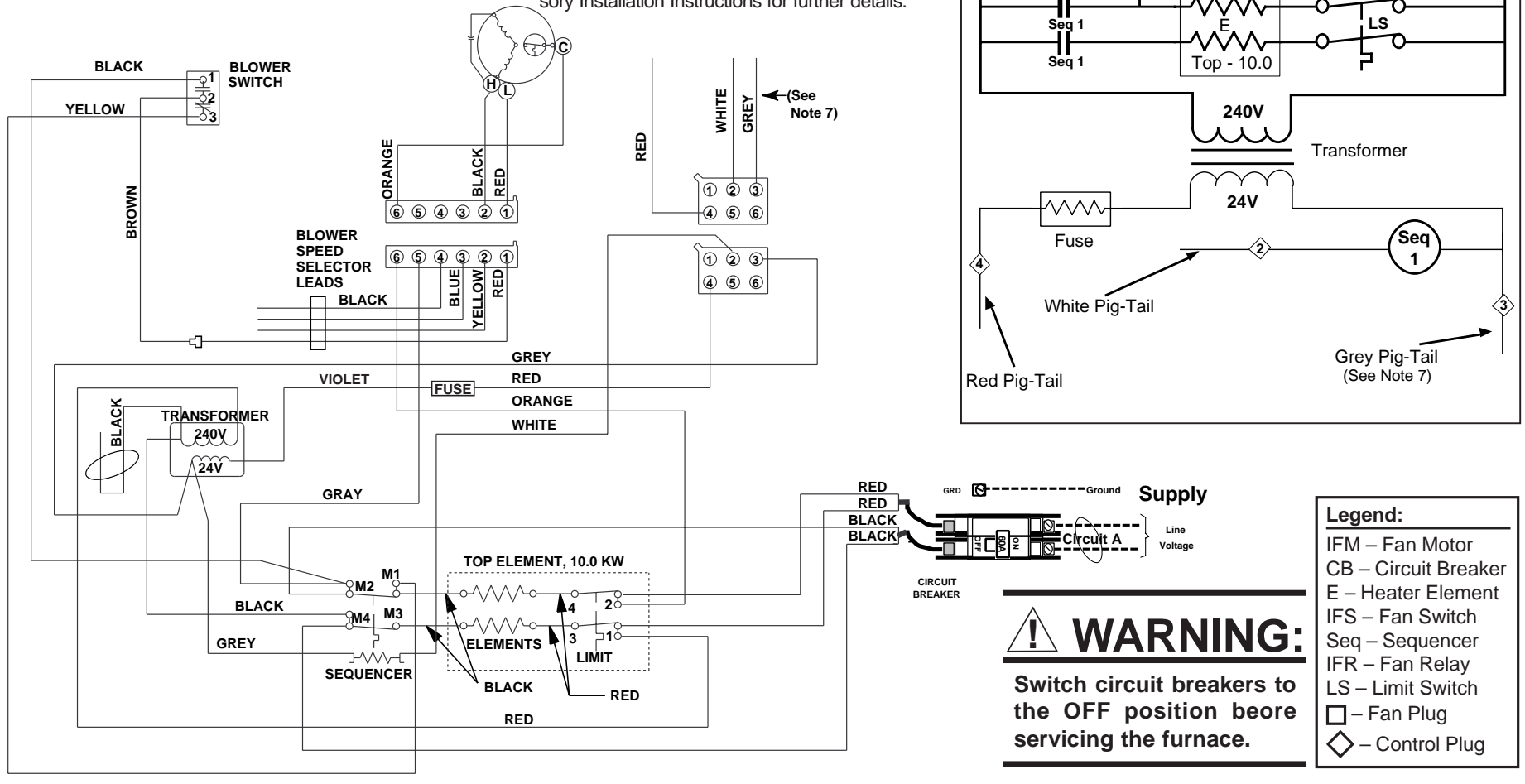
† For upflow application using upflow stand,
1" minimum per side.

Table 9. Clearances

Figure 20. E2EH 010 Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.20 Amps.
- 3) To change blower speeds 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:

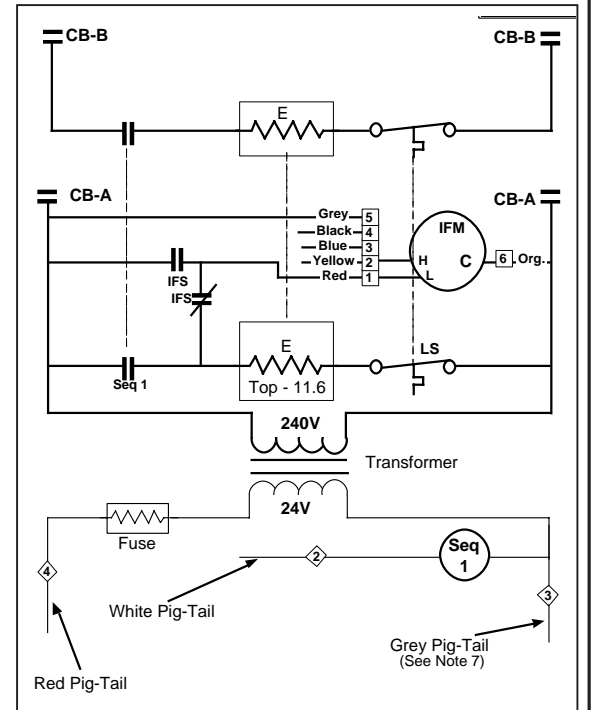
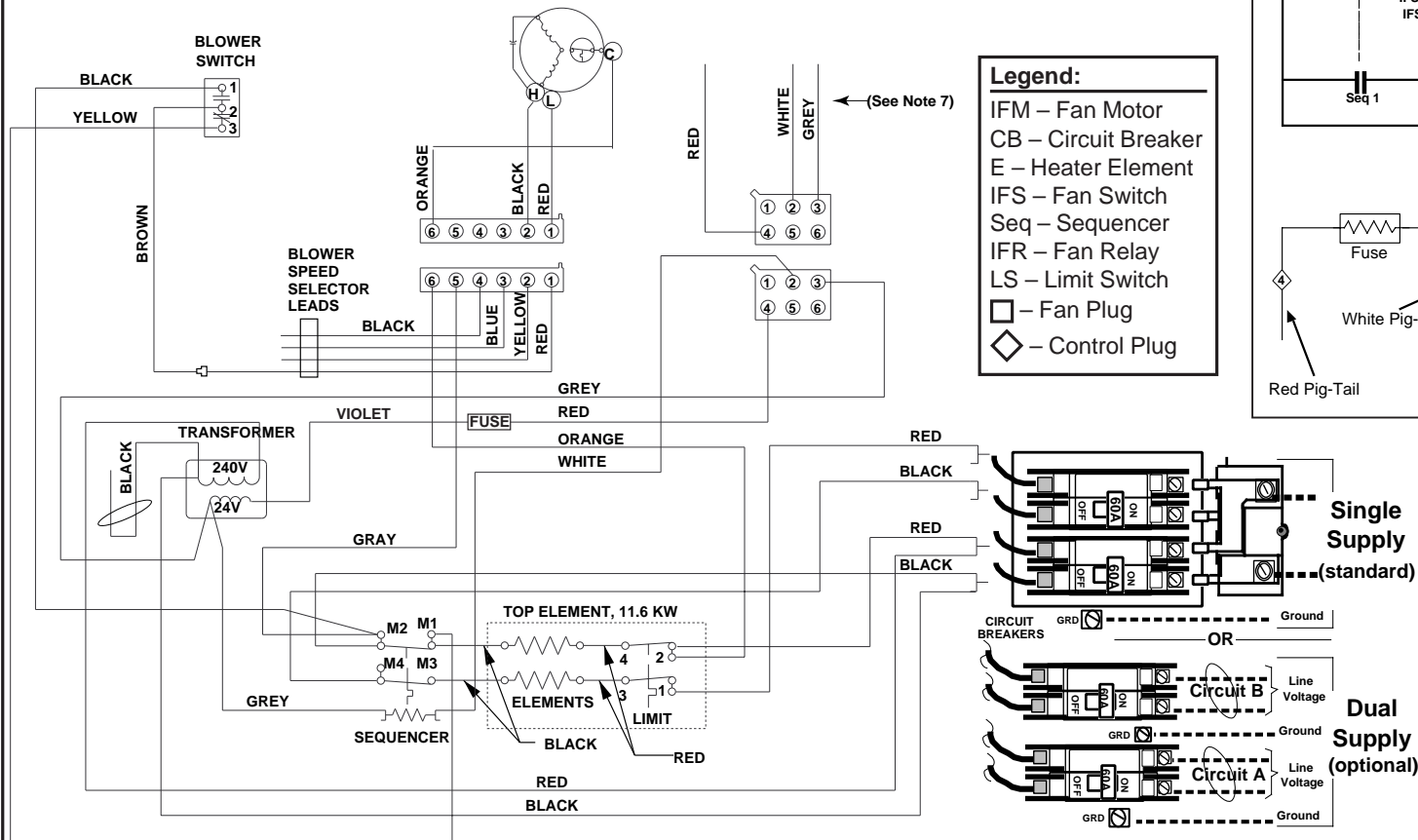
- IFM – Fan Motor
- CB – Circuit Breaker
- E – Heater Element
- IFS – Fan Switch
- Seq – Sequencer
- IFR – Fan Relay
- LS – Limit Switch
- – Fan Plug
- ◇ – Control Plug

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

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.20 Amps.
- 3) To change blower speeds 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.

Figure 21. E2EH 012 Wiring Diagrams

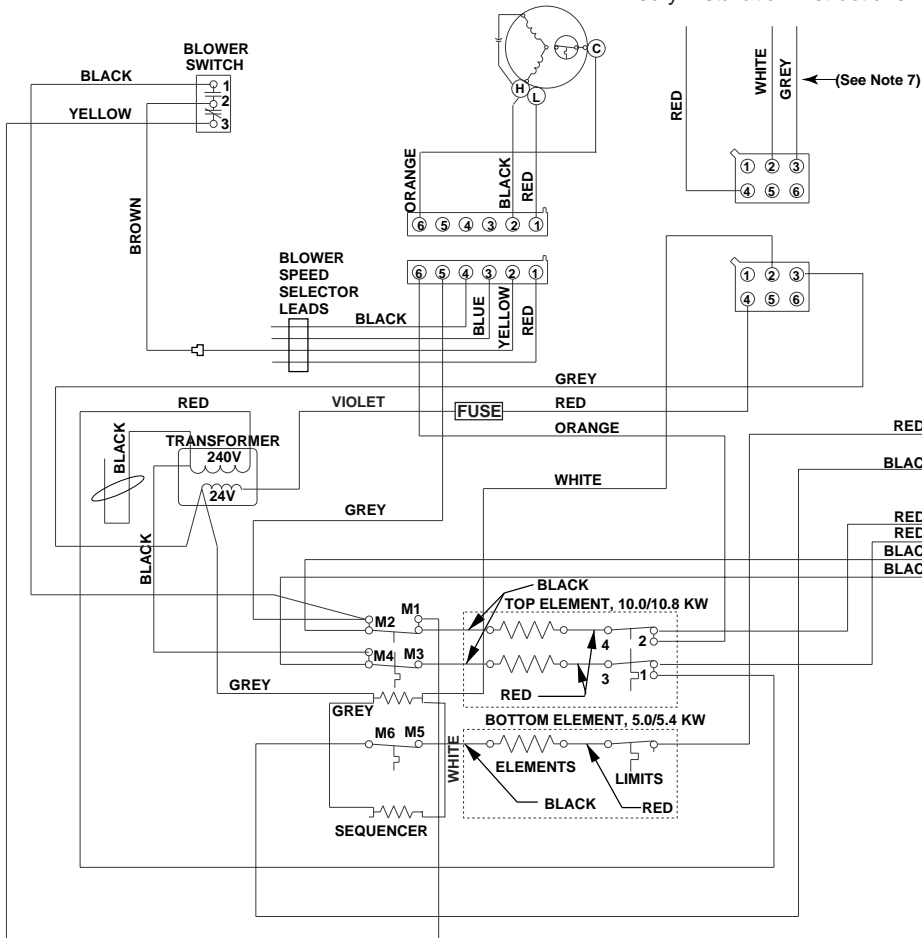


WARNING:

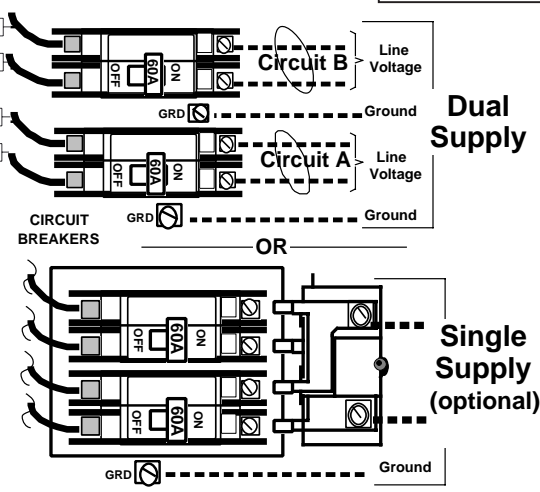
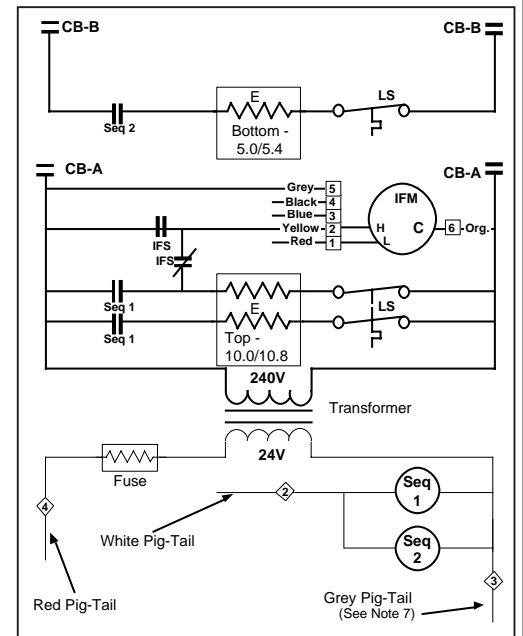
Switch circuit breakers to the OFF position before servicing the furnace.

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.40 Amps.
- 3) To change blower speeds 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.



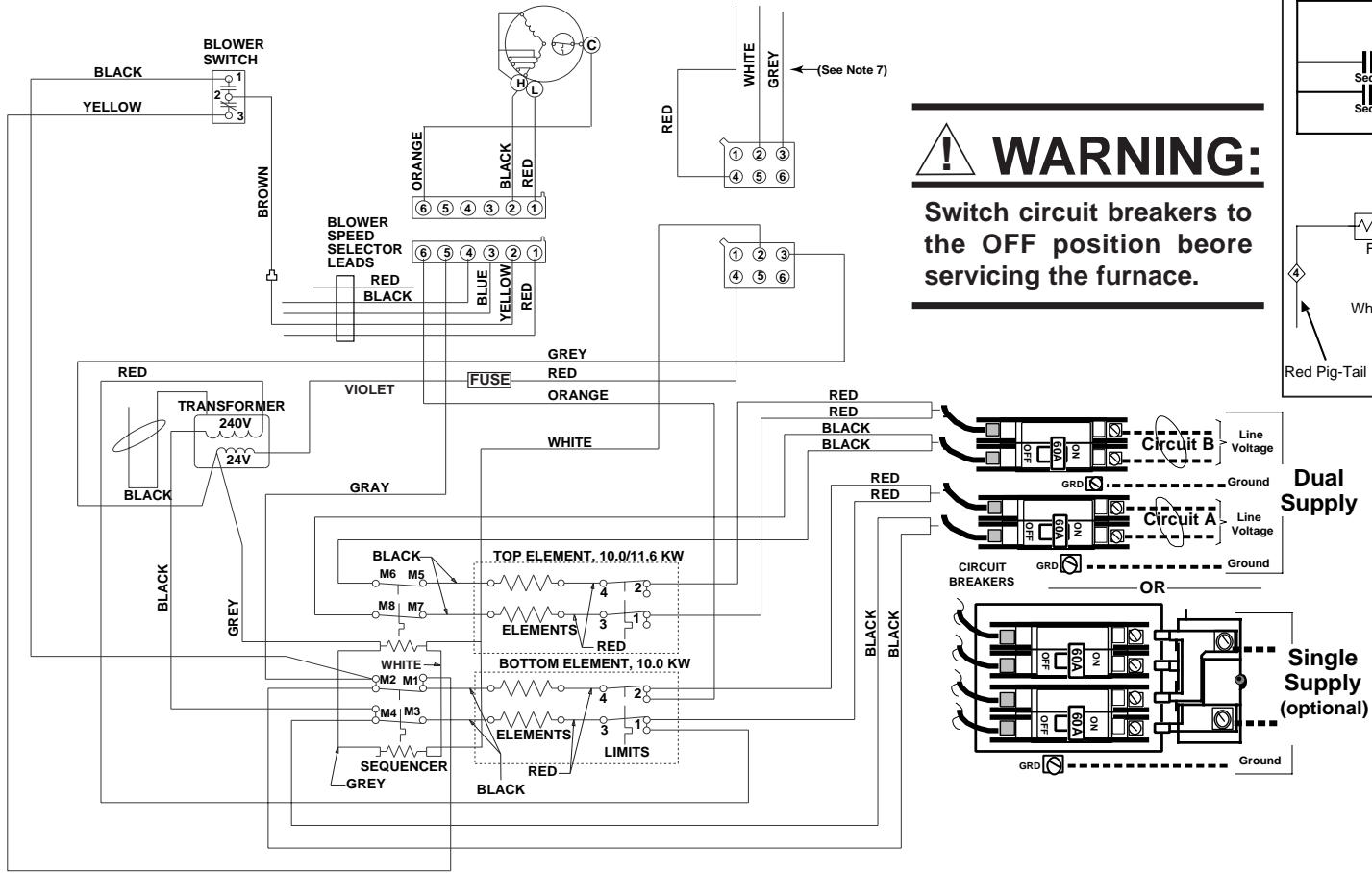
Legend:

- IFM – Fan Motor
- CB – Circuit Breaker
- E – Heater Element
- IFS – Fan Switch
- Seq – Sequencer
- IFR – Fan Relay
- LS – Limit Switch
- – Fan Plug
- ◇ – Control Plug

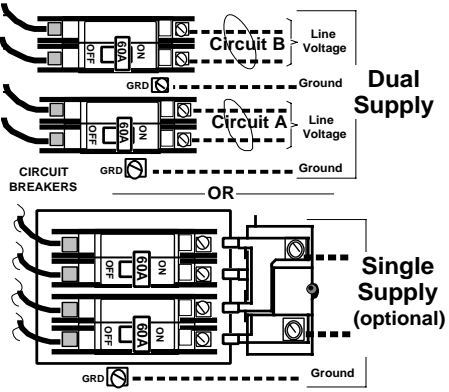
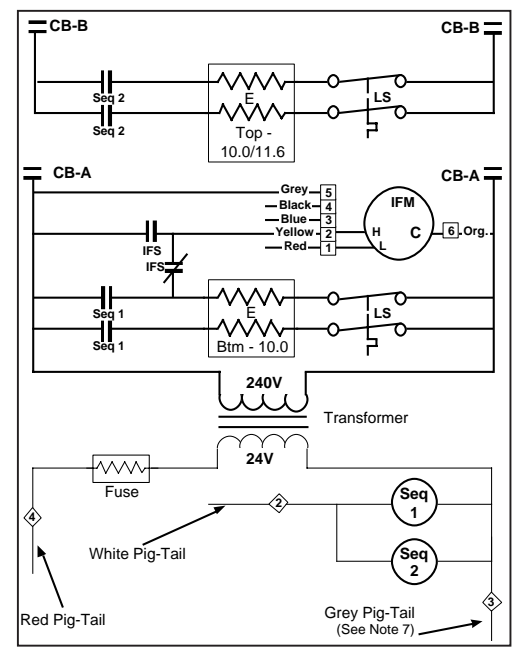
Figure 23. E2EH 020, 023 Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.40 Amps.
- 3) To change blower speeds 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.

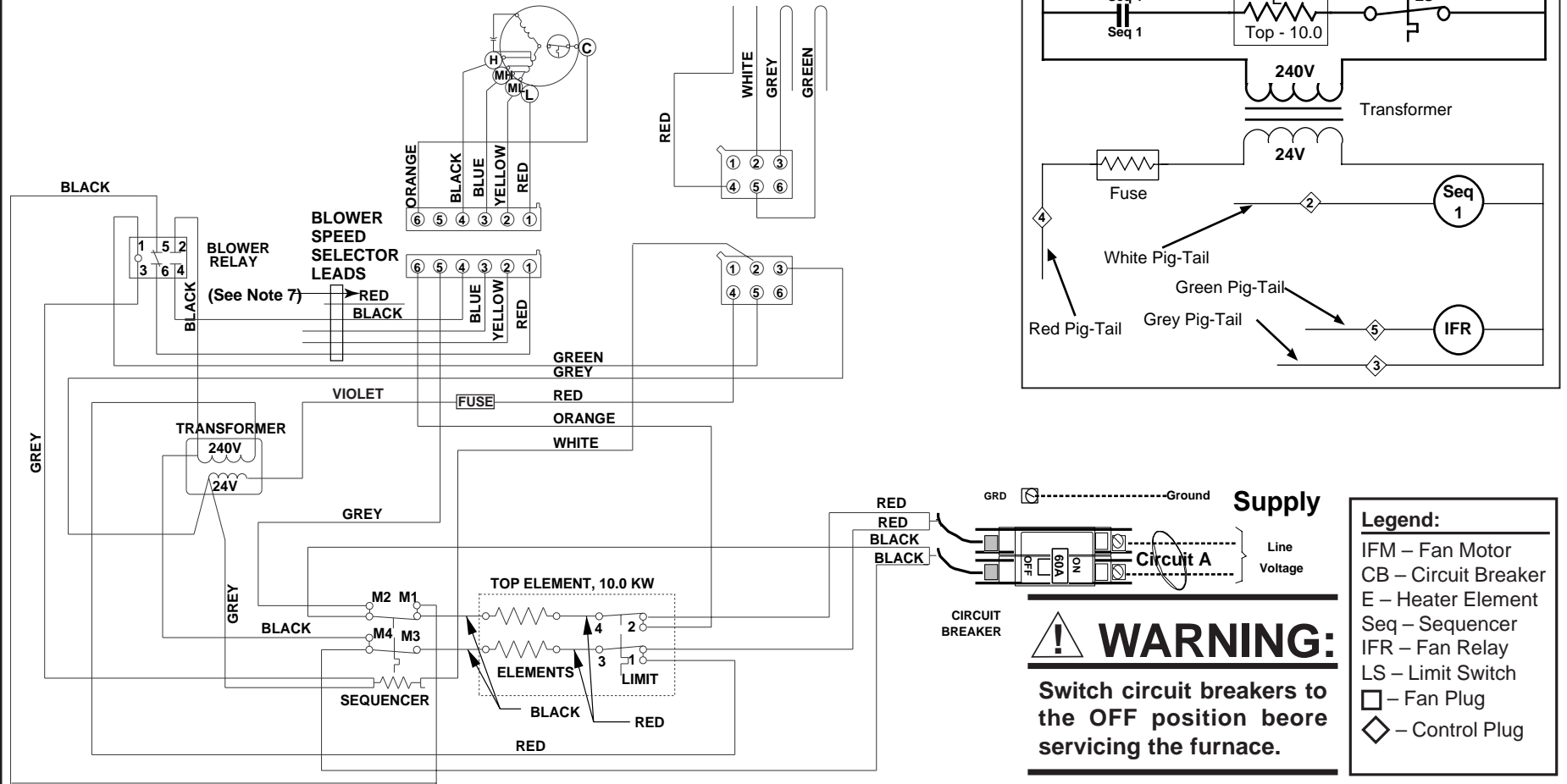


- Legend:**
- IFM – Fan Motor
 - CB – Circuit Breaker
 - E – Heater Element
 - IFS – Fan Switch
 - Seq – Sequencer
 - IFR – Fan Relay
 - LS – Limit Switch
 - – Fan Plug
 - ◇ – Control Plug

Figure 24. E2EB 010 Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.20 Amps.
- 3) To change blower speeds 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:

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

WARNING:

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

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.20 Amps.
- 3) To change blower speeds 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.

Figure 25. E2EB 012 Wiring Diagrams

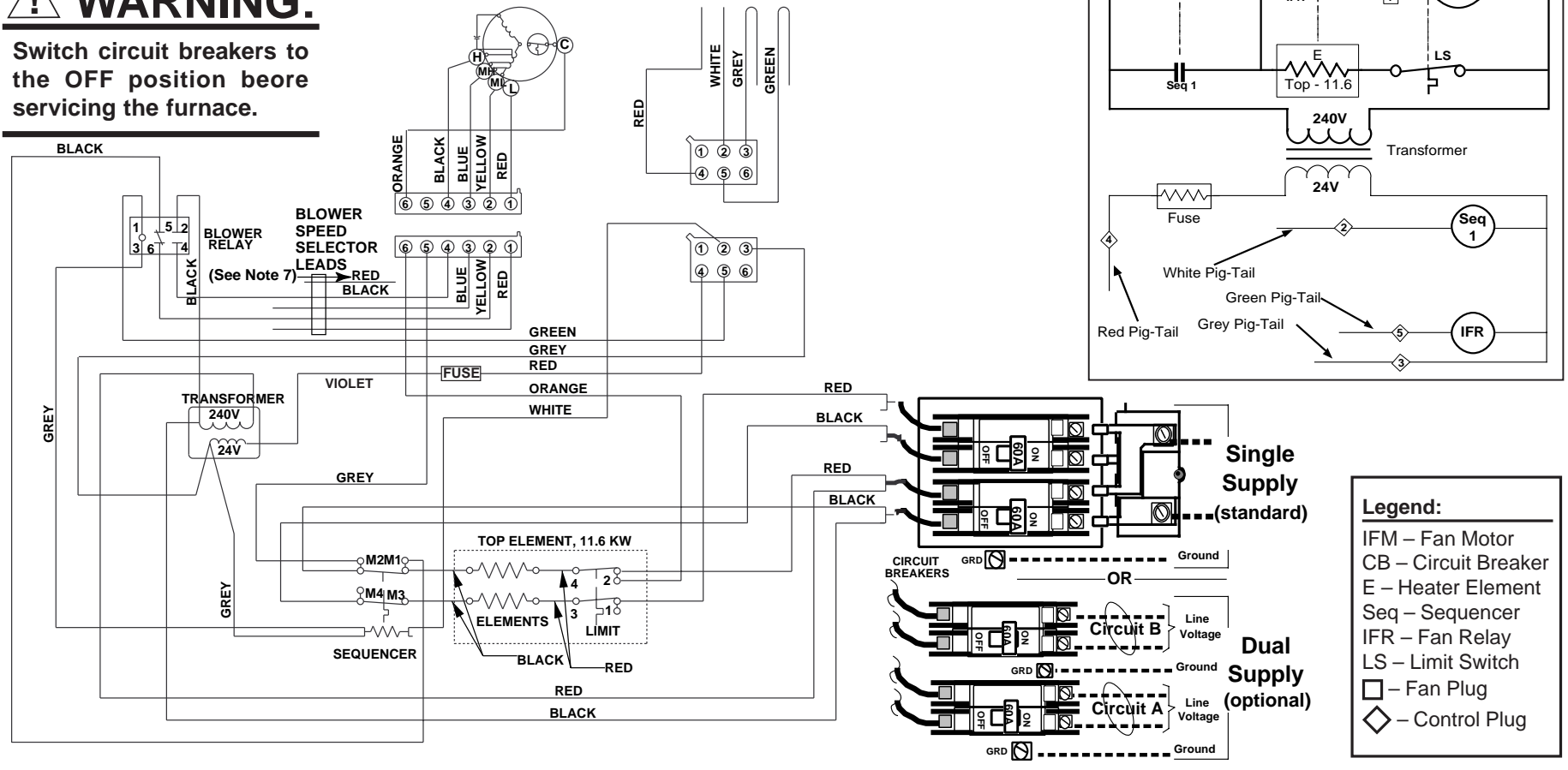
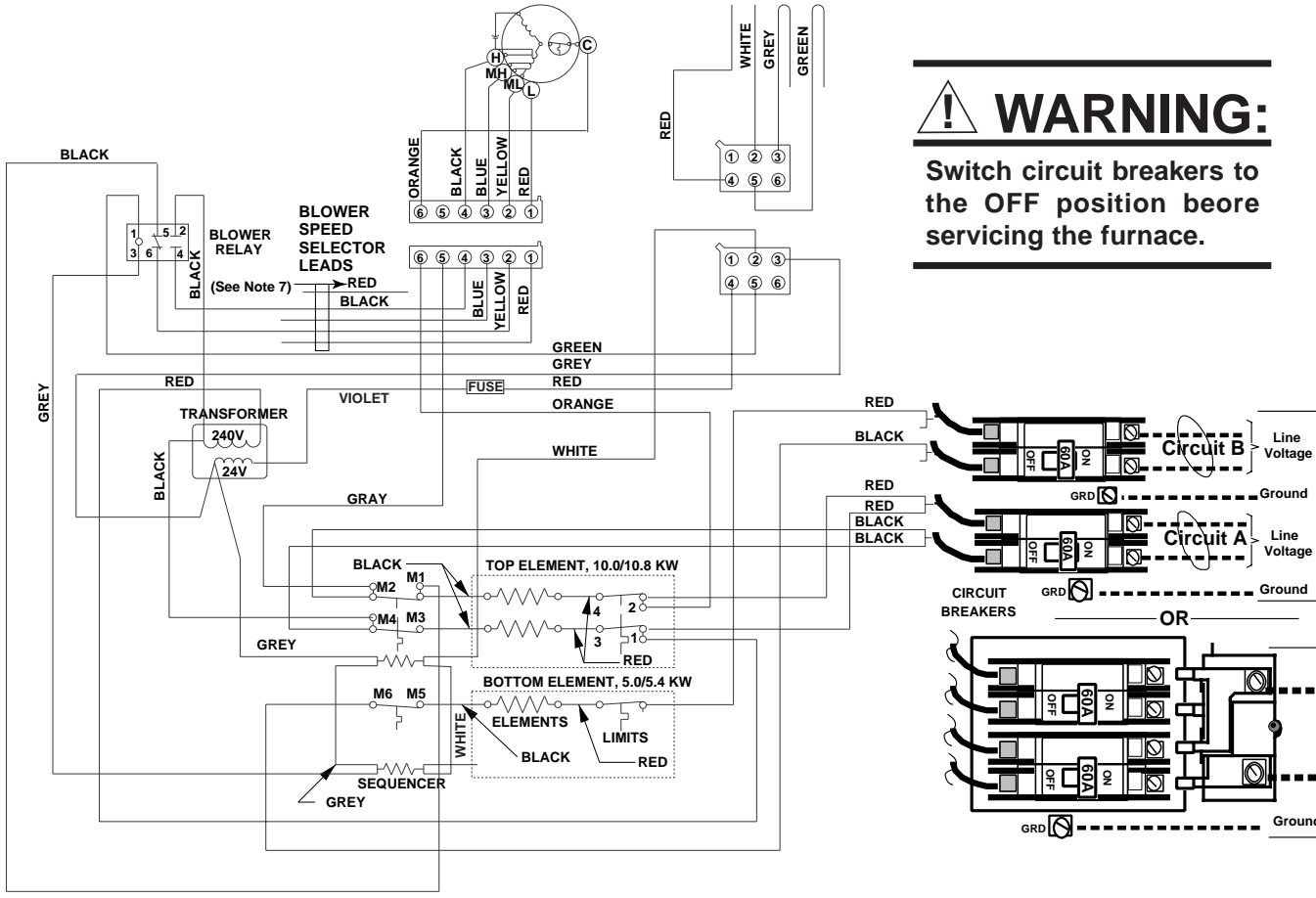


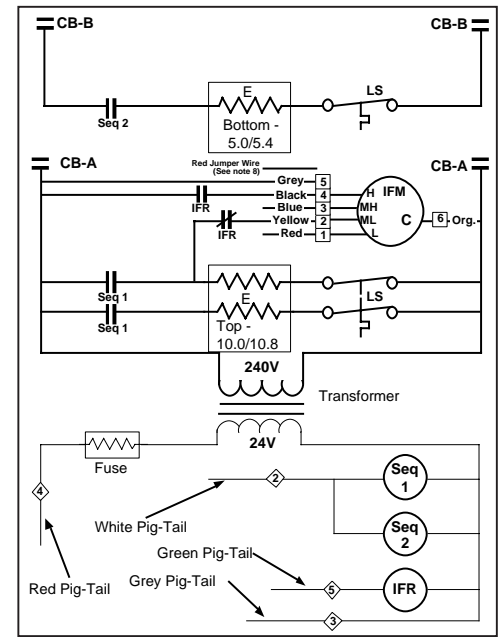
Figure 26. E2EB 015, 017 Wiring Diagrams

NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.40 Amps.
- 3) To change blower speeds 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.



Dual Supply

Single Supply (optional)

Legend:

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

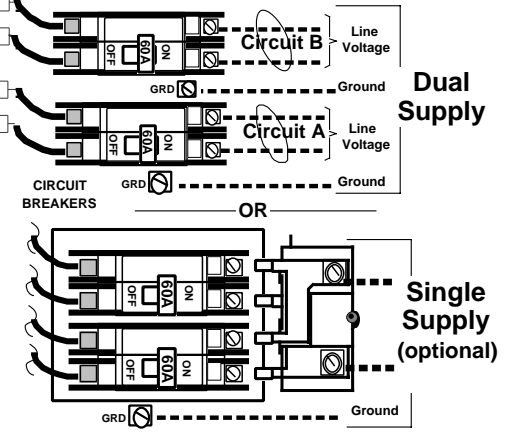
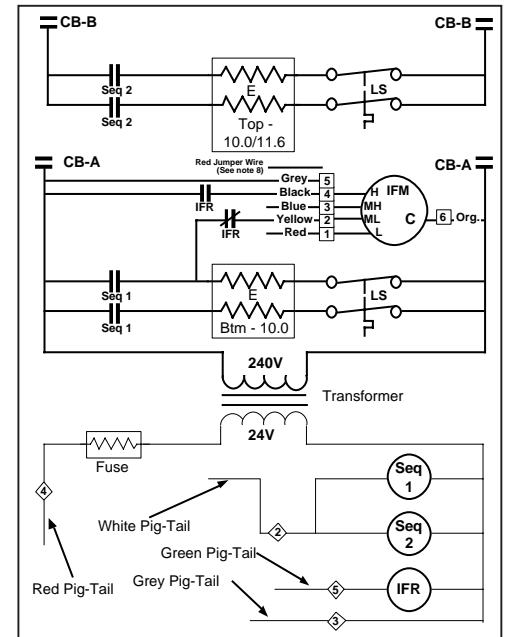
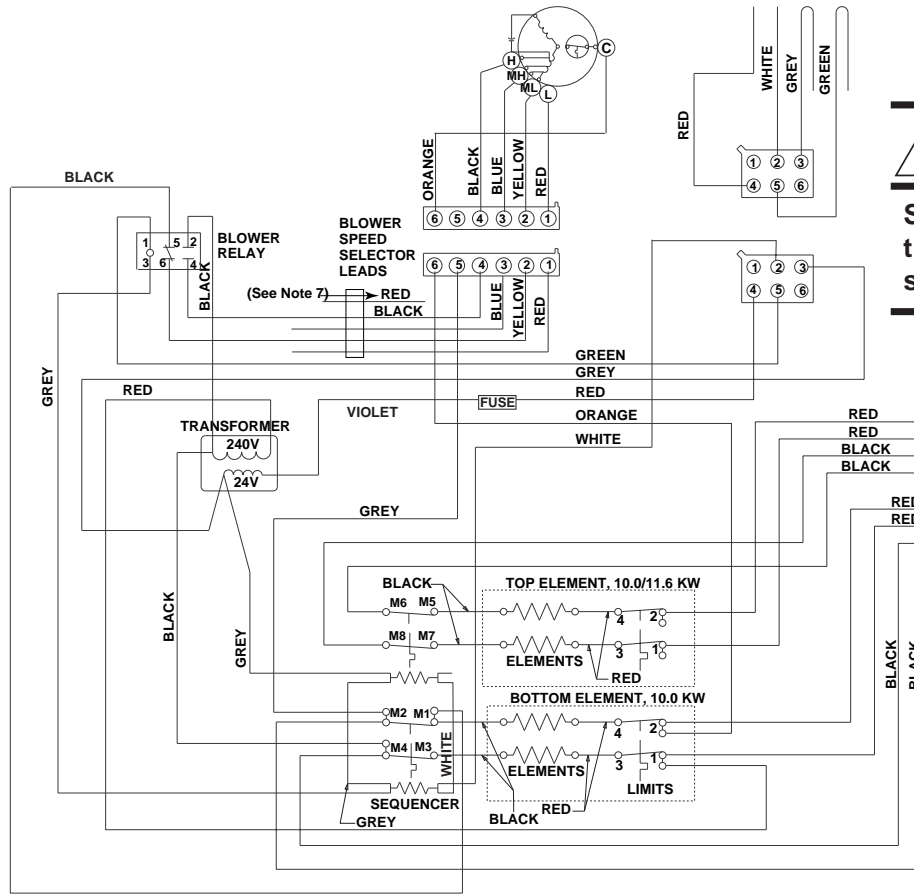
NOTES:

- 1) See unit data label for recommended supply wire sizes.
- 2) Thermostat anticipator setting: 0.40 Amps.
- 3) To change blower speeds 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

- 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.

Figure 27. E2EB 020, 023 Wiring Diagrams



Legend:

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

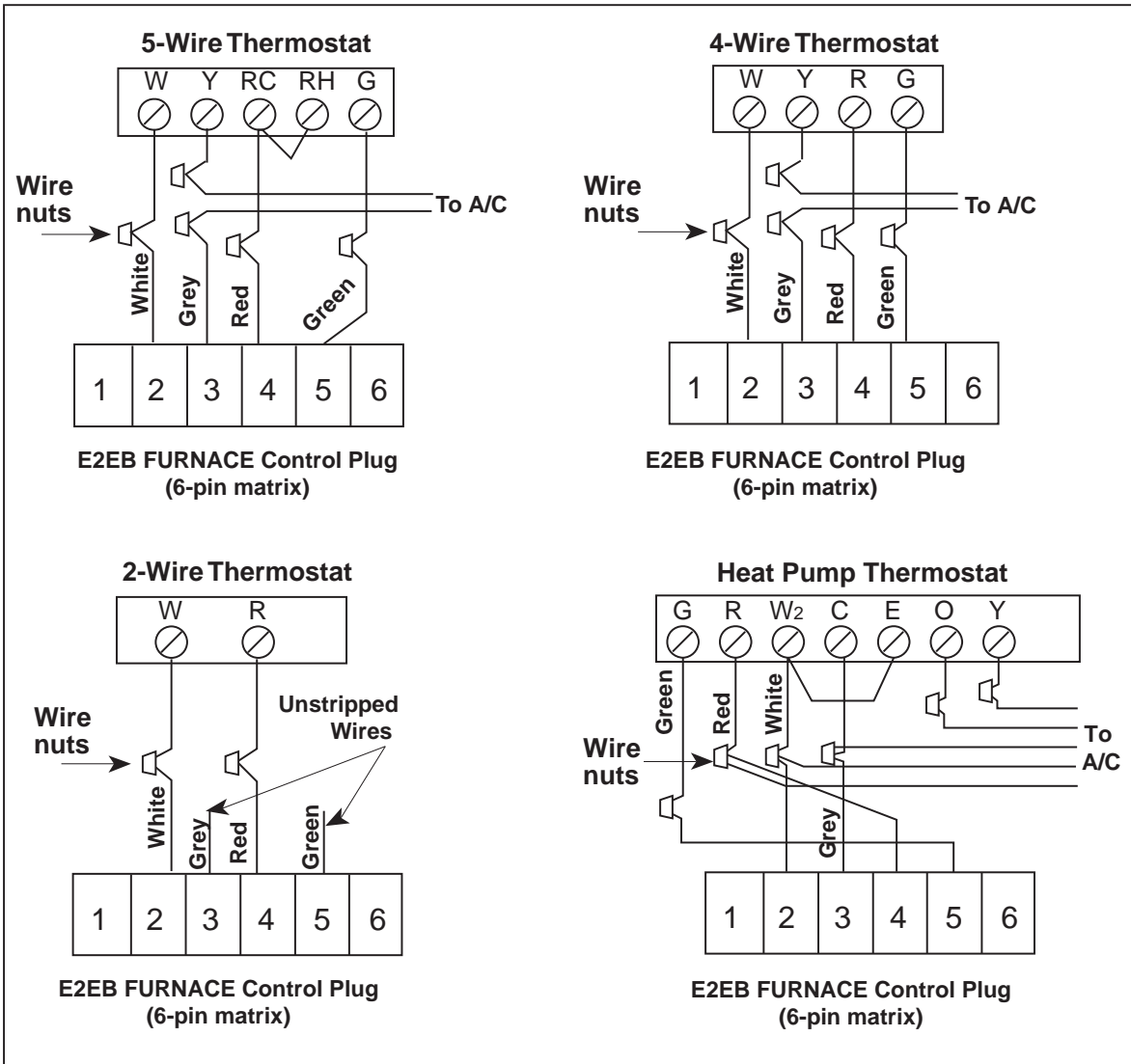


Figure 28. E2EB Thermostat Connection

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.



707716C

707716C (Replaces 707716B)