

## E7 Series Electric Furnace

# INSTALLATION INSTRUCTIONS

### Downflow & Upflow Models



**E7EM MULTI-POISE**



**E7EU UPFLOW**



**E7ED DOWNFLOW**

## **⚠ WARNING**

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

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

**Improper servicing could result in dangerous operation, serious injury, death or property damage.**

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

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

### **ATTENTION INSTALLERS:**

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the furnace or failure to follow safety warnings could result in serious injury, death, or property damage.

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

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## IMPORTANT SAFETY INFORMATION

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

## REQUIREMENTS & CODES

### **WARNING:**

**This unit must be installed in accordance with instructions outlined in this manual during the installation, service, and operation of this unit. Unqualified individuals should not attempt to interpret these instructions or install this equipment. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.**

- The installer must comply with all local codes and regulations which govern the installation of this type of equipment. Local codes and regulations take precedence over any recommendations contained in these instructions. Consult local building codes and the National Electrical Code (NEC) for special installation requirements.
- All electrical wiring must be completed in accordance with local, state and national codes and regulations and with the National Electric Code (ANSI/NFPA 70) or in Canada the Canadian Electric Code (CSA Z240.6.1, & Z240.9.1).
- Design and construction of the home duct system, must be in accordance with: HUD Manufactured Home Construction & Safety Standard (Title 24, Part 3280) and American National Standards (ANSI) A119.11, C1-NFPA 7.
- Plenums and air ducts must be installed in accordance with the Standard for the Installation of Air Conditioning and Ventilating Systems (NFPA No. 90A) or the Standard for the Installation of Warm Air Heating and Air Conditioning Systems (NFPA No. 90B).
- Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.

### Minimum Installation Clearances

- Access for positioning and servicing the unit must be considered when locating unit. The need to provide clearance for access to panels or doors may require clearance distances over and above the requirements. **For alcove installations allow 24 (61 cm) inches minimum clearance from the front of the unit for**

ALL MODELS	CLOSET	ALCOVE
Front **	6"	24"
Back	0"	0"
Sides*	0"	0"
Top	0"	0"
Top & Sides of Duct	0"	0"
Bottom of Duct	0"	0"

\*For upflow application using upflow stand, 3" minimum per side.

\*\*Service Clearance

**Table 1. Minimum Clearance Requirements**

**future servicing. Closet installations require 6 inches minimum.**

- This appliance must be installed in accordance with clearances listed in [Table 1](#). The furnace must be installed with ample clearance for easy access to the air filter, blower assembly, burner assembly, controls, and vent connections.
- Locate and install this unit in position as specified on [page 5](#). This unit is designed only for Indoor installations and should be located with consideration of minimizing the length of the supply and return ducts. See [Table 4 \(page 15\)](#), [Table 5 \(page 15\)](#), or the rating plate for circulating airflow data.

### Minimum Unobstructed Airflow

- Sufficient clearance for unobstructed airflow must be maintained in order to achieve rated performance. Air return to the furnace must have the minimum required total free area:
  - 200 in<sup>2</sup> (1290 cm<sup>2</sup>) for furnace only. May also include return air grille and frame assembly P/N 902989 or wall mount grille P/N 902999).
  - 235 in<sup>2</sup> (1516 cm<sup>2</sup>) with 4 ton or smaller A.C. or H.P. installed.
  - 250 in<sup>2</sup> (1613 cm<sup>2</sup>) with 4 ton or smaller A.C. or H.P. installed & 1" special clearance.
  - 275 in<sup>2</sup> (1775 cm<sup>2</sup>) with up to 5 ton A.C. or H.P. installed.
- If using louvered doors, the total free area must be calculated. Louvered doors installed at the factory are about 70% free area. If using a third party louvered door manufacturer, check their technical specifications to determine the free area.
- For closet installations with less than 6" front clearance, but not less than 1", a louvered door must be used having a minimum 250 sq in<sup>2</sup> (1,613 cm<sup>2</sup>) free area opening directly in line with openings in the furnace door

### Clearances to Combustible Materials

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

## CIRCULATING AIR REQUIREMENTS

### **WARNING:**

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

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

#### Return Air Connections

Air return to the furnace must have a minimum free area opening that meets the minimum installation clearances found on [page 5](#). A return air grille for closet or alcove installations is available. Acceptable installations with return air entering through an opening in the floor, ceiling of a closet, or alcove installation, must meet all of the following requirements:

- The return air opening, regardless of its location, must not be smaller than size specified on unit data label. If located in the floor, the opening must be provided with a means of preventing its inadvertent closure by flat object(s) placed over the opening.
- A return air grille must be used on the furnace when installed in a closet or alcove:

#### Upflow Alcove installations

- E7EM Models: Use a coil box with a solid door and an upflow stand ([Figure 1 \(page 5\)](#)). Part numbers can be found in the Technical Specifications Literature.
- E7EU Models: Use upflow stand.

#### Closet installations:

- All E7 Models: A louvered door must be added in the closet door or above it for adequate air flow.

#### Downflow alcove installations:

- E7EM Models: A grille 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 air conditioning or heat pump coils on top of the furnace.
- E7ED models are for non-ducted return.
- E7EU Models can be used for ducted return.
- 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.

#### Supply Air Connections

- Supply duct system must be designed for proper air distribution. Static pressure measured externally to furnace shall not exceed static pressure rating listed on furnace nameplate.

- Duct system must be designed so that no supply registers are located in duct system directly below the furnace.

#### Filtering Methods - Downflow Furnaces

##### Non-Ducted Return Air

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

- E7ED Models: Make sure there is an 18"x20" filter in the top filter rack and an 18"x30" filter in the front filter rack.

##### Without A/C or H/P uncased coil

- Use the filter supplied with the furnace. Make sure the filter is installed mat side down between the filter retainer and furnace top.

##### With A/C or H/P uncased coil

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

##### With optional coil housing

- See coil cabinet instructions for specific filtering methods.

##### Ducted Return Air

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

**NOTE:** Install a filter with a minimum unrestricted medium area that meets the application requirements of the furnace in the duct above the coil that is accessible for monthly cleaning or replacement by homeowner.

#### Filtering Methods - Upflow Furnaces

##### Non-Ducted Return Air

Furnaces may be installed with unducted or ducted return air. For unducted systems it is recommended to use an upflow stand for optimal performance.

##### Without optional upflow stand

- Install a filter with a minimum unrestricted medium area of 324 in<sup>2</sup> below the coil cabinet/furnace assembly that is accessible for monthly cleaning or replacement by the homeowner.

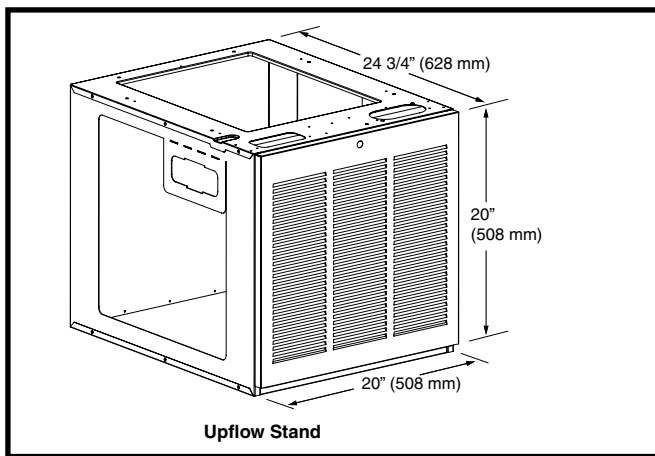
##### With optional upflow stand

- Stand ([Figure 1](#)) will use filters provided with the unit. Remove any filters in the furnace and follow proper installation. See instructions supplied with the upflow stand for additional details.

##### Ducted Return Air

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

- Install a filter with a minimum unrestricted medium area that meets the application requirements of the furnace below the coil cabinet/furnace assembly that



**Figure 1. Optional Upflow Stand**

is accessible for monthly cleaning or replacement by the homeowner

### Optional Equipment

**NOTE:** Refer to the instructions supplied with any additional accessories for further installation details. Ventilair attachment locations are indicated in [Figure 17 \(page 13\)](#), [Figure 18 \(page 13\)](#), & [Figure 19 \(page 14\)](#).

### Optional Automatic Furnace Damper

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

### Duct Connectors for Downflow Systems

Duct connectors are recommended for heated air distribution in under-the-floor duct systems. With this system, furnaces may be installed on combustible flooring without a separate sub-base. The furnace rear mounting plate ([Figure 5 \(page 7\)](#)) supplied with the duct connectors is recommended for use with this type of installation.

## FURNACE INSTALLATION

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

### General Information

This electric furnace is designed only for indoor installations. Units are approved for single/multistory residential or mobile / modular / manufactured structures in upflow and downflow (freestanding / closet / alcove) configurations.

Approved installation, operation, and maintenance of this appliance must be in accordance with the listed specifications contained in these instructions and other documents supplied with the furnace and/or optional air conditioning equipment. Unless it is noted differently in this manual, only use factory authorized kits and accessories

when modifying this appliance. Refer to local authorities having jurisdiction for further information.

### Before You Install this Furnace

- ✓ This equipment is securely packaged at the time of shipment and upon arrival should be carefully inspected for damage prior to installing the equipment at the job site. Claims for damage (apparent or concealed) should be filed immediately with the carrier.
- ✓ Check the electrical supply and verify the power supply is adequate for unit operation. The system must be wired and provided with circuit protection in accordance with local building codes. If there is any question concerning the power supply, contact the local power company.
- ✓ Verify the air delivery of the furnace is adequate to handle the static pressure drop of the coil, filter, and duct work.

### Locating the Unit

- Survey the job site to determine the best location for installing the unit. Consideration should be given to availability of electric power, service access, and noise.
- The dimensions of the room or alcove must be able to accommodate the overall size of the unit and the installation clearances in [Table 1 \(page 3\)](#). Physical dimensions for this furnace are shown in [Figure 17 \(page 13\)](#). If an upflow stand will be used, see [Figure 19 \(page 14\)](#) for component dimensions.
- The unit must be leveled at installation and attached to a properly installed duct system.
- The surface that the furnace is mounted on must provide sound physical support of the unit.

### Locating & Cutting Floor Openings

Floor cut-outs must be carefully located to avoid misalignment of the furnace and air duct. Standard and round cutouts for upflow furnaces are shown in [Figure 2 \(page 6\)](#). The cutouts for downflow furnaces are shown in [Figure 3 \(page 6\)](#).

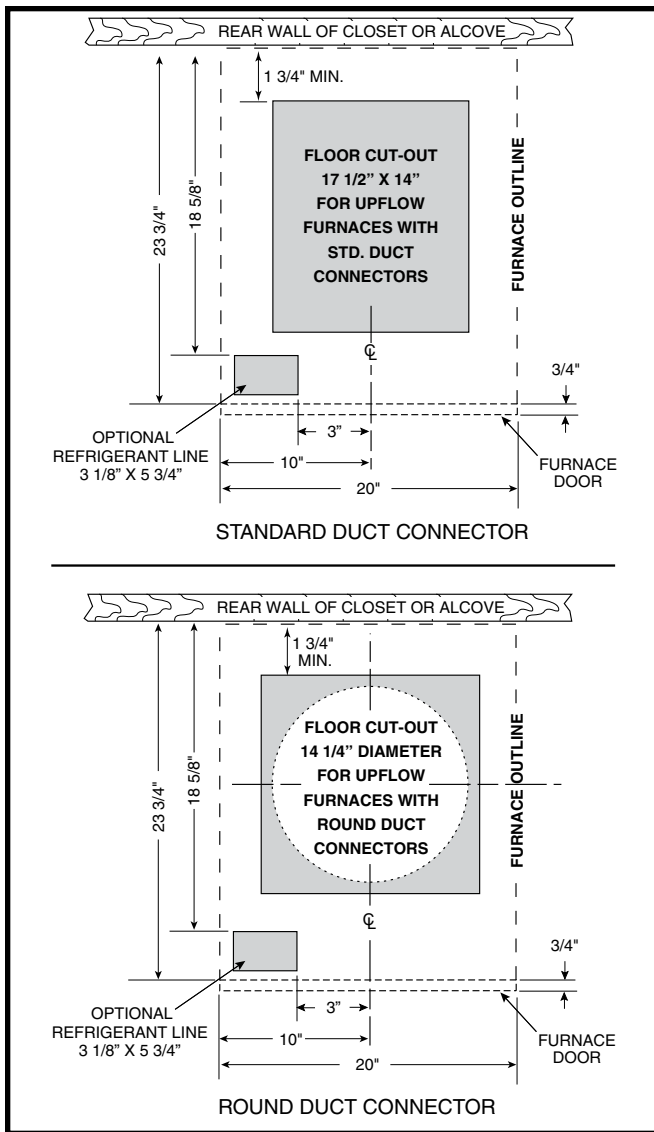
1. Measure and mark the centerline of the cutout. Provide minimum clearances at rear and right side walls of closet or alcove for installation of furnace and wiring.
2. Using the centerline as a starting point, draw the rest of the duct cut-out to the dimensions shown in [Figure 2](#) or [Figure 3](#).

**NOTE:** Additional provisions may be necessary for optional air conditioning or heat pump if refrigerant lines are installed elsewhere than at the front of the furnace. The refrigerant and entrance supply opening dimensions may be adjusted  $\pm 1/2$ ".

3. Cut out the floor opening  $1/16$ " larger than the actual cutout drawn. This will allow some clearance when installing the duct connector.
4. Measure from the top of the floor down to the top of the supply air duct to obtain the depth of the floor cavity.

**NOTE:** The depth of the floor cavity (shown as "X" in [Figure 4 \(page 6\)](#)) will determine the correct duct connector.

5. Determine which duct connector to use from [Table 2 \(page 7\)](#).

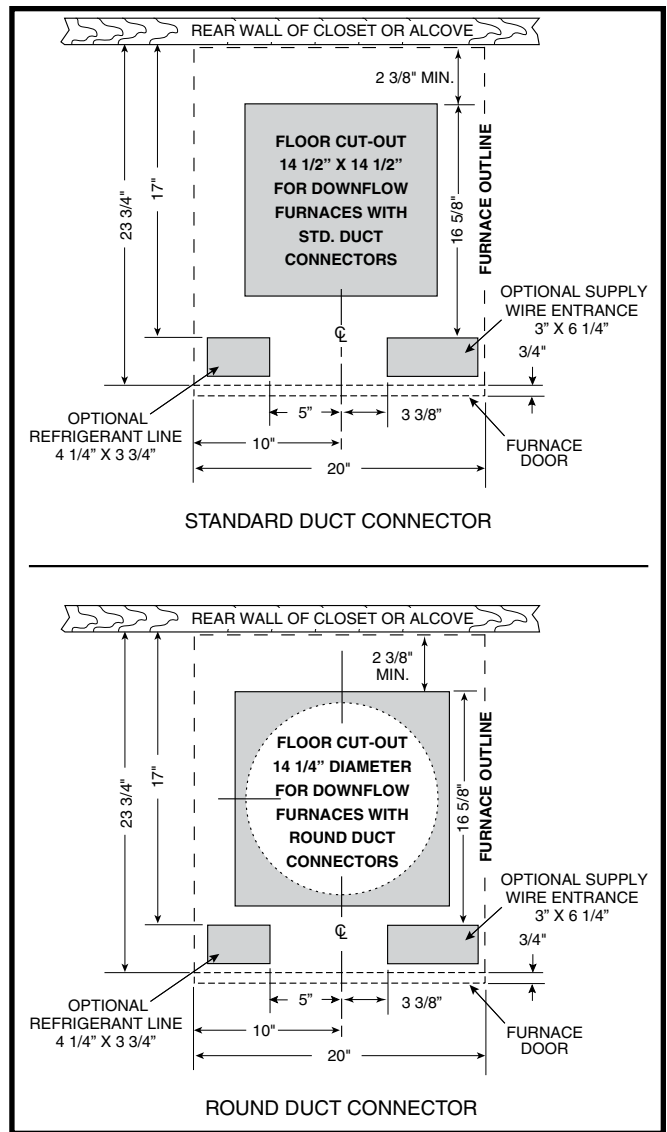


**Figure 2. Cut-Out Dimensions for Upflow Furnaces**

**Standard Duct Connector Installation**

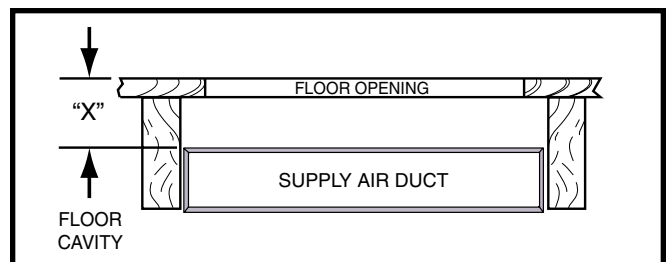
The standard duct connector is designed for use on ducts 12" in width. **NOTE:** Ducts narrower than 12" may not allow sufficient clearances for this type of installation. See Narrow Duct Connector section.

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



**Figure 3. Cut-Out Dimensions for Downflow Furnaces**

7. Bend the connector tabs on the bottom of the duct connector upwards and as tight as possible against the supply air duct. See Figure 6 (page 7).
8. Seal all connections with industrial grade sealing tape or liquid sealant. See HUD Code 3280.715 for acceptable standards for sealing products.



**Figure 4. Floor Cavity**



IF FLOOR CAVITY "X" IS:	DUCT CONNECTOR TYPE & PART NUMBER	
	STANDARD DUCT	SCREW DOWN
7/8" / (22)	901987A	904008
2" / (51)	901988A	904009
4-1/4" / (108)	901989A	904010
6-1/4" / (159)	901990A	904011
8-1/4" / (210)	901991A	904012
10-1/4" / (260)	901992A	904013
12-1/4" / (311)	901993A	904014

NOTE: Dimensions shown as Inches / (Millimeter)

Table 2. Duct Connector Sizes

### Narrow Duct Connectors

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

- Score and cut the top of the supply air duct as indicated in Option 1 or Option 2 (Figure 7). With Option 1 choice, cut out the metal from the shaded area.
- Fold the two flaps (Options 1 or 2) up to form the opening for the duct connector.
- Install the duct connector with the bottom tabs extending into the supply air duct.
- Bend the tabs on the bottom of the duct connector upwards and as tight as possible against the supply air duct. See Figure 8 (page 8).
- Form the flaps (Options 1 or 2) up against the duct connector as tight as possible.
- Secure the duct connector flaps to the supply air duct with staples (3 minimum) or if a 2x block/joist is not provided, use sheet metal screws (2 minimum).  
**NOTE:** The duct connector tabs may be attached to the air duct with sheet metal screws or other suitable fasteners as long as the duct connector and the air duct are securely attached.
- Seal all connections with industrial grade sealing tape or liquid sealant.

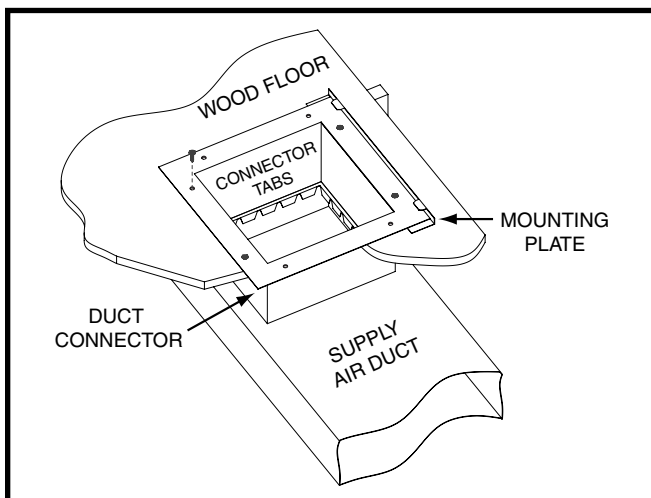


Figure 5. Standard Duct Connector Installed

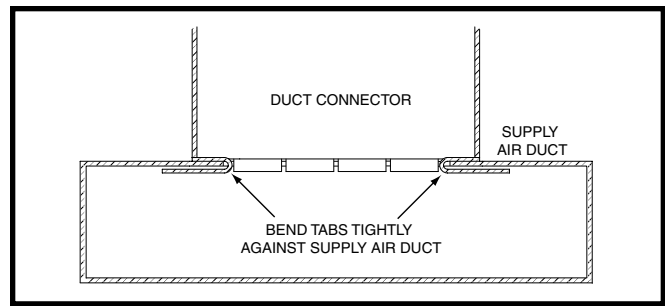


Figure 6. Duct Connector Tabs

### Round Duct Connector Installation

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

- Apply a bead of caulking, mastic, or other approved sealant around bottom side of connector.
- Install and center the duct connector in the floor opening.
- Install the mounting plate under the back side of the duct connector. See Figure 9 (page 8). **NOTE:** Align the screw holes in both components.
- Secure the duct connector and the mounting plate to the wood floor with appropriate size screws.
- Connect the round supply duct to the underside of the duct connector and secure them with field supplied sheet metal screws.
- Seal all connections with industrial grade sealing tape or liquid sealant.

### Alcove Installation

- Cut alcove rough openings to minimum dimensions shown in Figure 10 (page 8). **NOTE:** The height may increase depending on the size of the coil compartment.
- Attach a return air method to the furnace. Depending on the application, this could be a louvered door coil box, frame and grille assembly, or an upflow stand with solid door coil box.

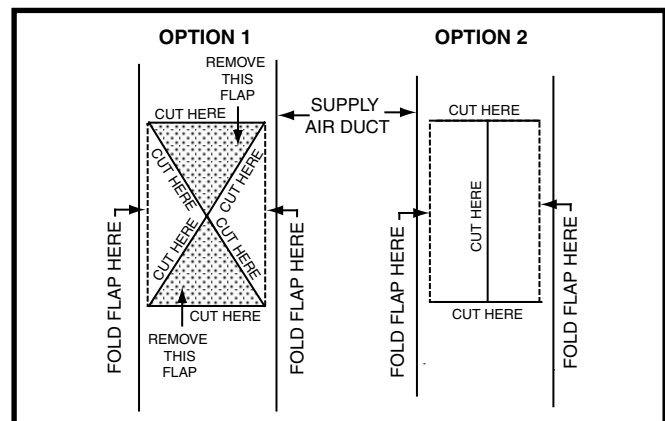
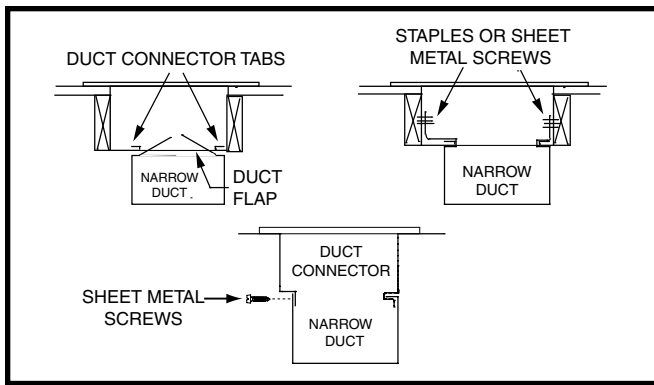
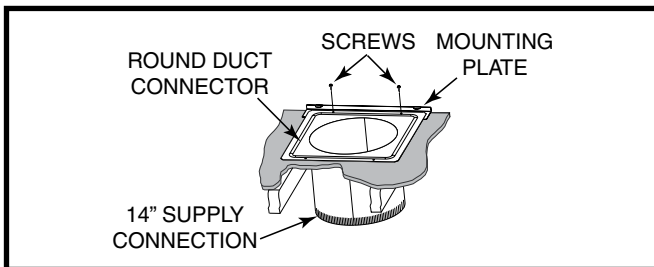


Figure 7. Narrow Air Duct Openings



**Figure 8. Narrow Ducts**



**Figure 9. Round Duct Connector Installed**

### Closet Installation

For closet installations, a coil box is recommended to be installed with the furnace. In all configurations, return air must meet requirements found in Minimum Unobstructed Airflow section. See [Figure 11 \(page 9\)](#).

1. Cut return air opening in desired position in door or wall. Best practice is above the furnace. Refer to the Minimum Unobstructed Airflow section ([page 3](#)) for return air opening requirements.
2. Insert four fasteners, securing grille to door or wall.

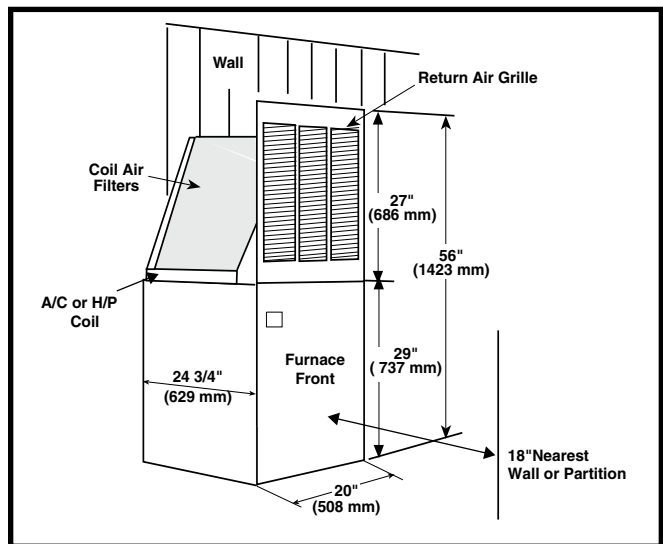
### Downflow Furnaces

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

The steps below describe installation procedures for an under-the-floor supply duct system with a ducted or unducted return air system. Duct connectors are recommended for this application. See [Table 2 \(page 7\)](#).

**NOTE:** Remove refrigerant line knockouts in furnace only when installing indoor coil of an air conditioner or heat pump system. Refer to instructions supplied with accessory equipment.

1. Route 240V supply circuit(s) and 24V wiring to closet or alcove. See [Figure 17 \(page 13\)](#) or [Figure 18 \(page 13\)](#) for locations.
2. Remove furnace front door and slide back until bottom slots in rear of unit engage with both tabs of optional rear mounting plate. If mounting plate is not used, an equivalent method of securing the rear of the unit may be used as long as it prevents displacement during transport if used in a manufactured home.



**Figure 10. Alcove Installation**

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

4. Secure front of unit with one or more fasteners at mounting hole(s) provided or at tie-down tab. See [Figure 17 \(page 13\)](#) or [Figure 18 \(page 13\)](#).
5. See Electrical Wiring section ([page 10](#)) to complete furnace installation.

### Upflow Furnaces

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

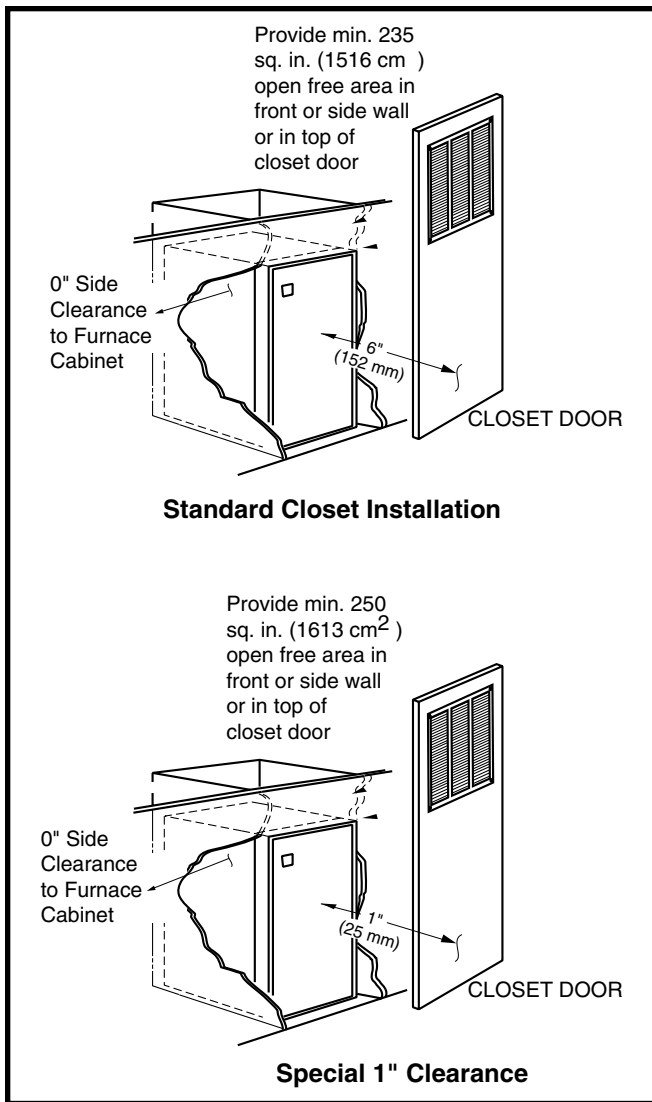
**NOTE:** Remove refrigerant line knockouts in furnace only when installing indoor coil from an air conditioner or heat pump system.

Refer to instructions supplied with accessory equipment.

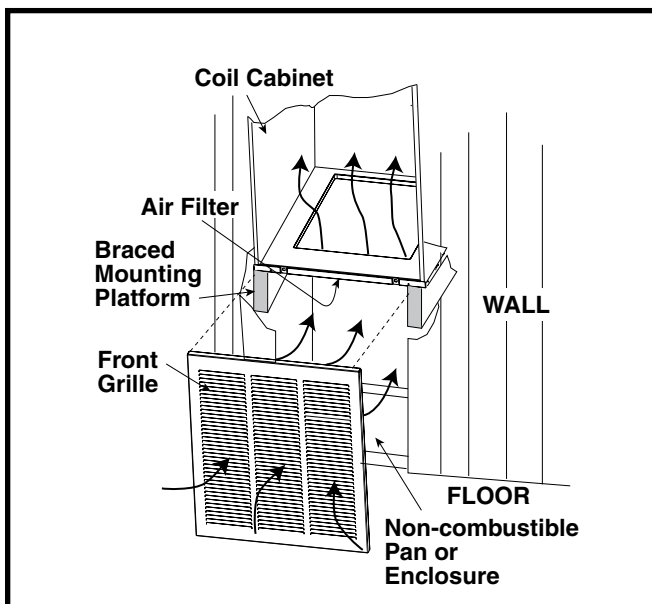
### Over-the-Floor Return Air System (Non-Ducted)

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 12 \(page 9\)](#).
2. Use optional upflow stand (refer to the technical specifications literature for part number) with filters or construct a suitably braced mounting platform in closet. See [Figure 13 \(page 9\)](#).
3. Route 240V supply circuit(s) and 24V wiring to closet. See [Figure 17 \(page 13\)](#) or [Figure 18 \(page 13\)](#) 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 13](#).





**Figure 11. Closet Installation**

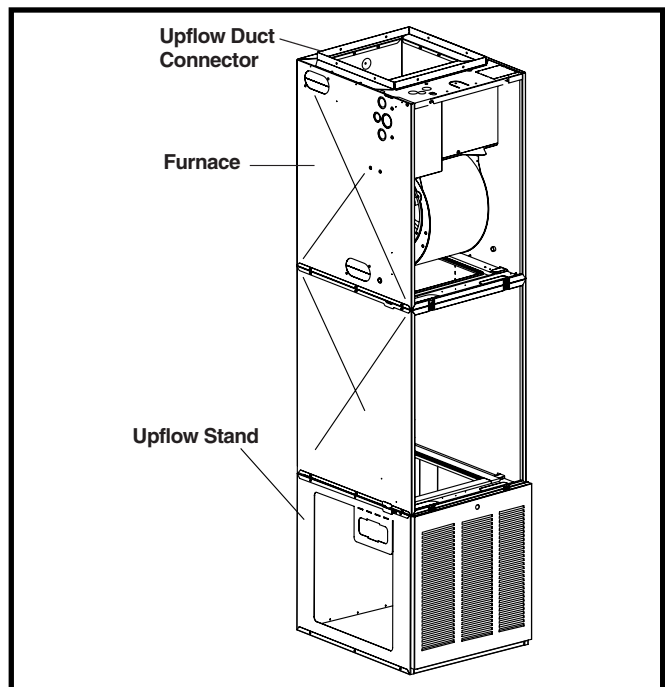


**Figure 12. Over-the-Floor Return Air System**

7. Install return air grille in closet preferably at same level as upflow stand or below mounting platform. See [Figure 12](#).

**Through-the-Floor Return Air System (Ducted)**

1. Prepare Floor Opening(s):
  - a. Mark floor openings as shown in [Figure 2 \(page 6\)](#). Provide minimum clearances at rear and left side walls of closet for installation of furnace and wiring.
  - b. Cut floor opening on outside edge of marked line so that opening is slightly larger than area marked.
  - c. Additional provisions may be necessary for optional air conditioning if refrigerant lines are installed other than at the front of the furnace.
2. If return air duct is made of combustible material, locate a pan fabricated of non-combustible material with 1" upturned flanges under furnace return air opening.
3. Route 240V supply circuit(s) and 24V wiring to closet. See [Figure 17 \(page 13\)](#) or [Figure 18 \(page 13\)](#) 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 13](#).



**Figure 13. Over-the-Floor Return Air System with Upflow Stand**

## ELECTRICAL WIRING

### ⚠️ WARNING:

#### ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

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

Improper servicing could result in dangerous operation, serious injury, death or property damage.

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

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

#### Line Voltage Wiring

##### IMPORTANT NOTES

- Proper line voltage polarity must be maintained for the control system to operate correctly.
- Circuit breakers installed in this unit provide short-circuit protection of the internal wiring and serve as a disconnect. The circuit breakers DO NOT provide over-current protection of the supply wiring and may be sized larger than the branch circuit protection. Overcurrent protection of the supply wiring is provided by the breaker in the distribution panel and must be sized as shown in [Table 7 \(page 17\)](#).

It is recommended that the line voltage (240 VAC) to the furnace be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the furnace. For minimum circuit ampacity and maximum over-current protection, see [Table 7](#). See unit wiring diagrams ([Figure 22 \(page 18\)](#), [Figure 23 \(page 19\)](#), [Figure 24 \(page 20\)](#), [Figure 25 \(page 21\)](#), & [Figure 26 \(page 22\)](#)) for wiring details. Electrical components are shown in [Figure 16 \(page 12\)](#). Supply circuit requirements are listed below:

- -010 model is factory-wired for single-branch supply circuit only.
- -012 models are factory-wired for single-branch supply circuit (single-circuit kit factory installed). Dual-branch circuit can be used by removing factory-installed single-circuit kit. See [Figure 14 \(page 10\)](#).
- -015, -017, -020 and -023 models are factory-wired for dual-branch supply circuit. Single-branch circuit can be used by installing optional single-circuit kit.

#### Connecting Supply Service Wires

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

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

### ⚠️ WARNING:

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

3. Install listed cable connector(s) in opening(s). If metal-sheathed conduit is used for incoming power line(s), provide an approved metal clamp on conduit and secure it in entrance knockout.
4. Insert supply service wire(s) through cable connector(s) and connect wires to circuit breakers ([Figure 14](#) & [Figure 15](#)). **NOTE:** To install single-circuit kit, perform step 5. If single-circuit kit installation is not needed, go to step 6.
5. To install optional single-circuit kit:
  - a. Loosen lugs at supply side of circuit breakers.
  - b. Remove cover from single-circuit kit (if supplied).
  - c. Insert metal buss bars of kit into lugs of circuit breaker.
  - d. Tighten lugs securely (31 in.-lbs. recommended).
6. Connect service ground wire(s) to grounding lug(s) provided. See [Figure 16 \(page 12\)](#). One ground is required for each supply circuit used.

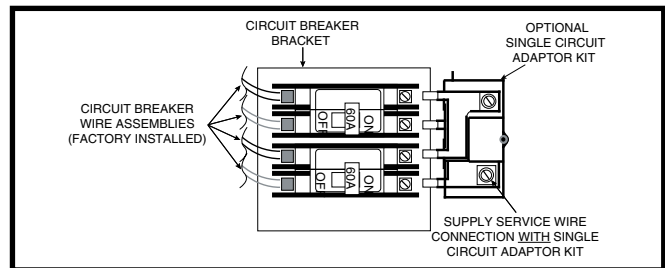


Figure 14. Optional Single Circuit Adaptor Kit

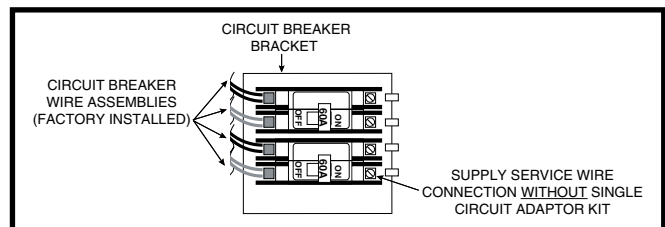


Figure 15. Installation of Supply Service Wires

## Grounding

### **WARNING:**

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

### Thermostat / Low Voltage Connections

- The furnace is designed to be controlled by a 24 VAC thermostat. The thermostat's wiring must comply with the current provisions of the NEC (ANSI/NFPA 70) and with applicable local codes having jurisdiction.
- The thermostat should be mounted about 5 feet above the floor on an inside wall. DO NOT install the thermostat on an outside wall or any other location where its operation may be adversely affected by radiant heat from fireplaces, sunlight, or lighting fixtures, and convective heat from warm air registers or electrical appliances. Refer to the thermostat manufacturer's instruction sheet for detailed mounting information. See [Figure 20 \(page 16\)](#) for typical thermostat connections.

### Humidifier

The unit has an output to power a humidifier when the blower is running during a call for heat. This output is rated to 1.0 amp at 208/240V.

### Dehumidification Options

The motor control board has a **DHUM** or **D** connection (violet wire) that allows the system to increase the amount of humidity that is removed from the circulating air. See [Figure 21 \(page 17\)](#) This is accomplished by reducing the CFM and allowing the cooling coil to become colder. This will only occur when there is a call for cooling. There are many ways that this can be electrically wired.

1. If the room thermostat incorporates a humidity sensor and DHUM output, connect the DHUM on the thermostat to the D terminal on the motor control board. See [Figure 21](#).
2. If using a separate humidistat, connect the **DHUM & R** terminals on the humidistat to the **D & R** terminals on the motor control board of the air handler. In this option, the **DHUM** output of the humidistat must be set so it is only closed when there is a call for dehumidification.
3. If a humidistat is not available, it is an acceptable option to connect the **R & D** terminals on the motor control board together with a field supplied wire. This option causes the blower to run at a reduced CFM for 10 minutes after a call for cooling. **NOTE:** If outdoor unit is a heat pump, connect the **O** terminal to the **D** terminal.

DISPLAY CODE	CURRENT MODE	
-	-	Standby is a Rotating Segment
⌈	⌋	Cooling Mode (Y input active)
H	H	Heating Mode (W input active)
F	⌋	Circulate Fan Mode (G input active)
d	P	Dehum Cooling Mode (DEHUM input active along with Y)
i	i	(one) A Motor Fault has Occurred (BMF active for more than 30 seconds)
⋈	⌋	(lower case t) Over Temperatures (The value of the TS input has exceeded 80C all outputs are stopped.)
L	⌋	Lockout (Ten (10) or more Motor Faults or Over Temperature events have occurred. All outputs are set to off for one hour.

**NOTE:** Display code may be inverted depending on final installation orientation.

**Table 3. FSHE Motor Control Board Display Codes**

### Electronic Air Cleaner (EAC)

The unit has an output to power an electronic air cleaner when the blower is running. This output is rated to 1.0 amp at 208/240V. See [Figure 21 \(page 17\)](#).

### Changing Blower Speed

#### **NOTE TO INSTALLER**

**When the unit is installed, the heating and cooling speeds must be set for that particular installation. The installer is responsible for setting these speeds.**

Blower speed is determined by the DIP switch settings located on the unit control board. Pins 1-4 set the speed for heating. Pins 5-8 set the speed for cooling/heat pump. Refer to [Table 6 \(page 16\)](#) for allowable heating speeds. See [Table 4 \(page 15\)](#) and [Table 5 \(page 15\)](#) for blower performance data.

### Installing Control Circuit Wiring

**NOTE:** Installation of at least a four-wire thermostat circuit is required. However best practice is to use five-wire for future addition of a heat/cool thermostat. Any unused thermostat leads must be properly capped. See [Figure 20 \(page 16\)](#) for various thermostat connections.

1. Install the 24V control-circuit cable through plastic bushing at either side of furnace.
2. Route control circuit wiring to wall thermostat and outdoor section, if installed.

## START-UP & ADJUSTMENTS

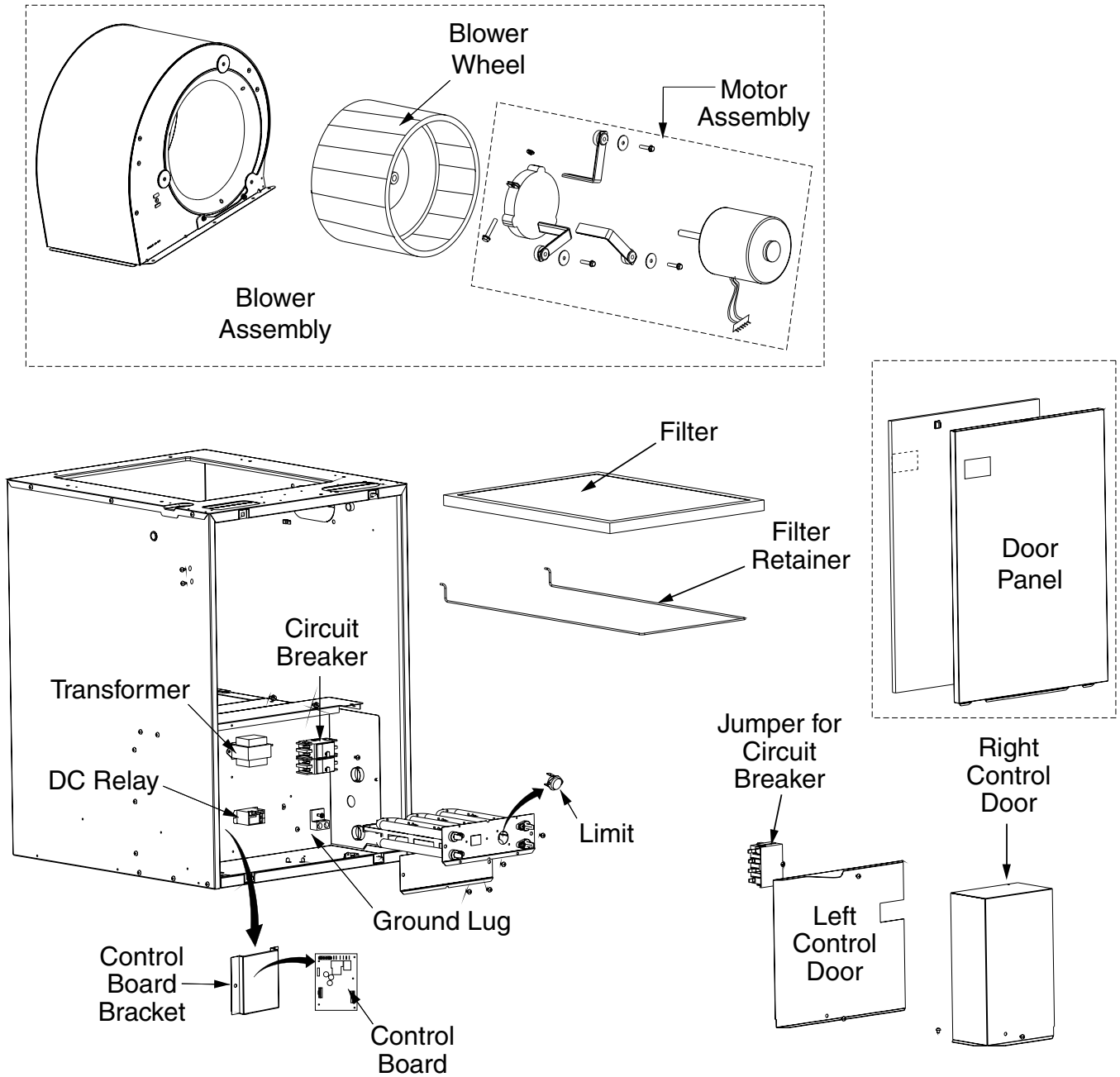
### Pre-Start Check List

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

### Start-up Procedures

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

**FIGURES & TABLES**



**Figure 16. E7 Furnace Components  
(Multi-Poise Shown)**

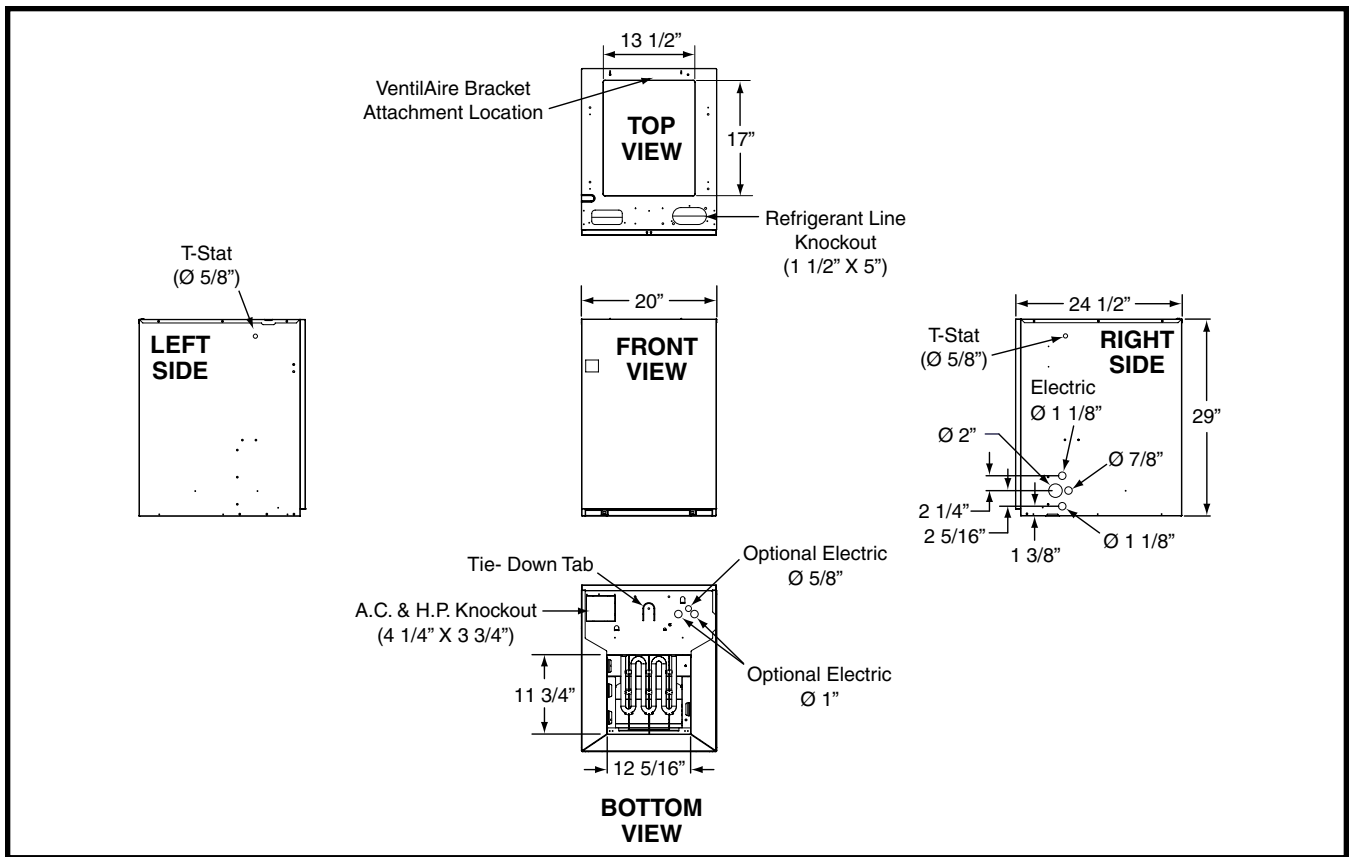


Figure 17. E7EM Physical Dimensions

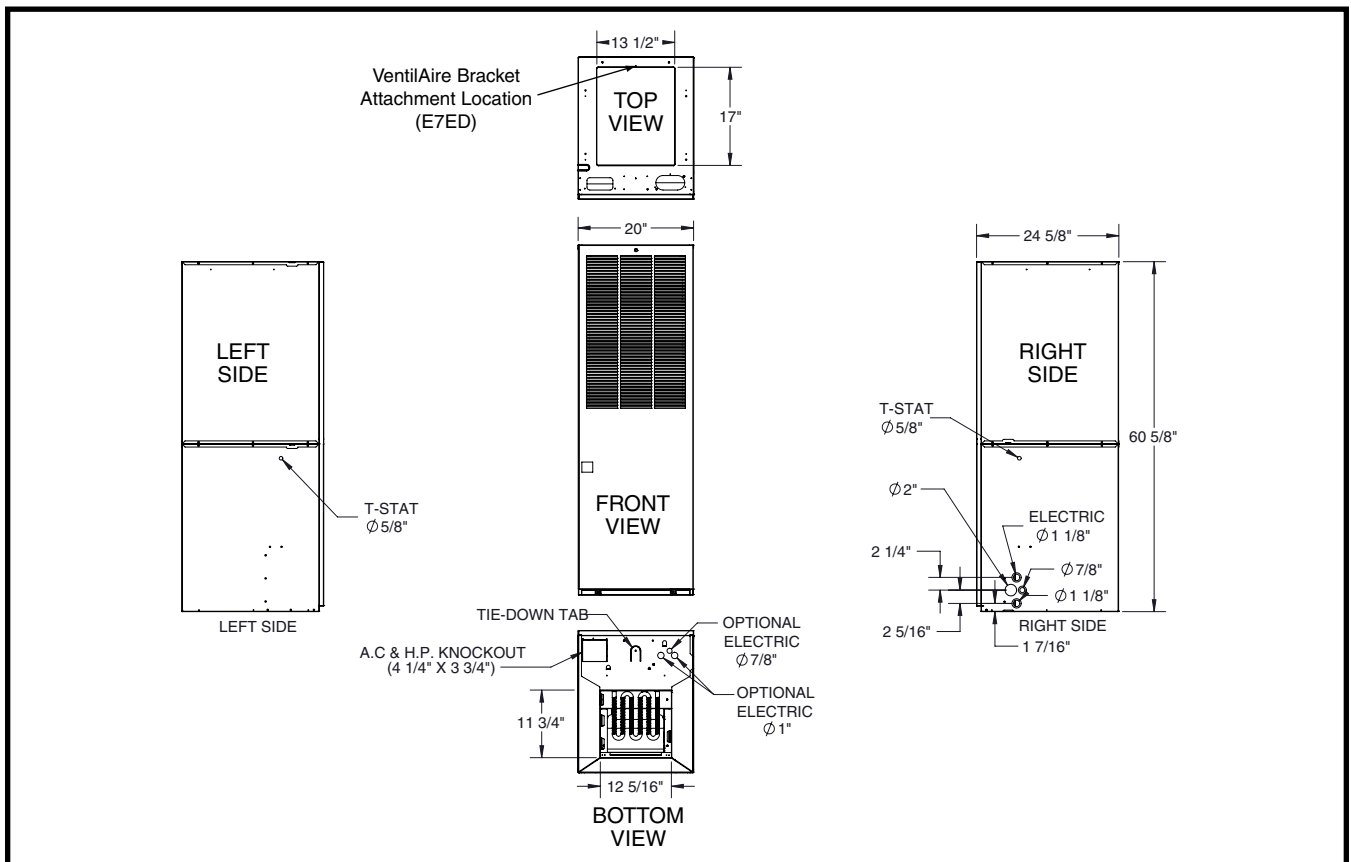
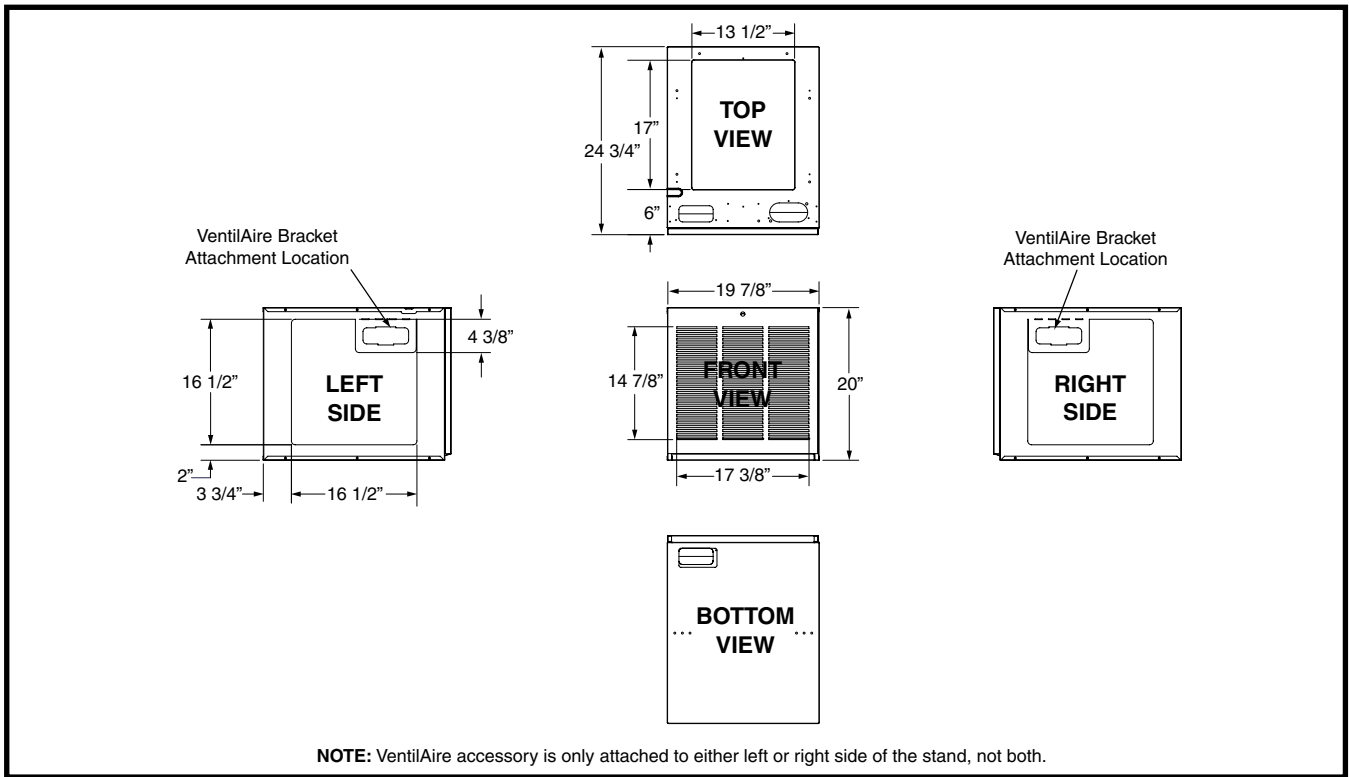


Figure 18. E7EU & E7ED Physical Dimensions





**Figure 19. E7 Furnace Upflow Stand Dimensions**

## Airflow Data

AIRFLOW (CFM)										
MODEL NUMBER	MOTOR SWITCH SETTINGS (0=OFF, 1=ON)				EXTERNAL STATIC PRESSURE (IN. W.C.)					
					0.1	0.2	0.3	0.4	0.5	0.6
	1/5	2/6	3/7	4/8	CFM	CFM	CFM	CFM	CFM	CFM
E7E*-0**H1	0	0	0	0	685	640	606	560	513	460
	1	0	0	0	770	727	692	648	599	552
	0	1	0	0	854	815	779	737	685	645
	1	1	0	0	939	902	865	825	771	737
	0	0	1	0	1,012	974	938	899	850	813
	1	0	1	0	1,084	1,047	1,011	973	930	888
	0	1	1	0	1,157	1,119	1,084	1,047	1,009	964
	1	1	1	0	1,197	1,166	1,130	1,093	1,056	1,017
	0	0	0	1	1,245	1,215	1,178	1,143	1,105	1,066
	1	0	0	1	1,293	1,263	1,225	1,192	1,154	1,114
	0	1	0	1	1,344	1,312	1,278	1,242	1,206	1,169
	1	1	0	1	1,394	1,361	1,330	1,291	1,257	1,223
	0	0	1	1	1,434	1,401	1,369	1,332	1,299	1,267
	1	0	1	1	1,473	1,441	1,408	1,373	1,340	1,311
	0	1	1	1	1,514	1,483	1,451	1,417	1,386	1,355
1	1	1	1	1,555	1,525	1,494	1,460	1,431	1,398	

**NOTES:**

1. Motor switch settings for heating speeds use HEAT switches 1, 2, 3, and 4. For cooling speeds use COOL switches 5, 6, 7, and 8.
2. To comply with government mandated efficiency standards, two openings are required for airflows above 1600 CFM.
3. Data is shown with filter

**Table 4. E7 Airflow Data**

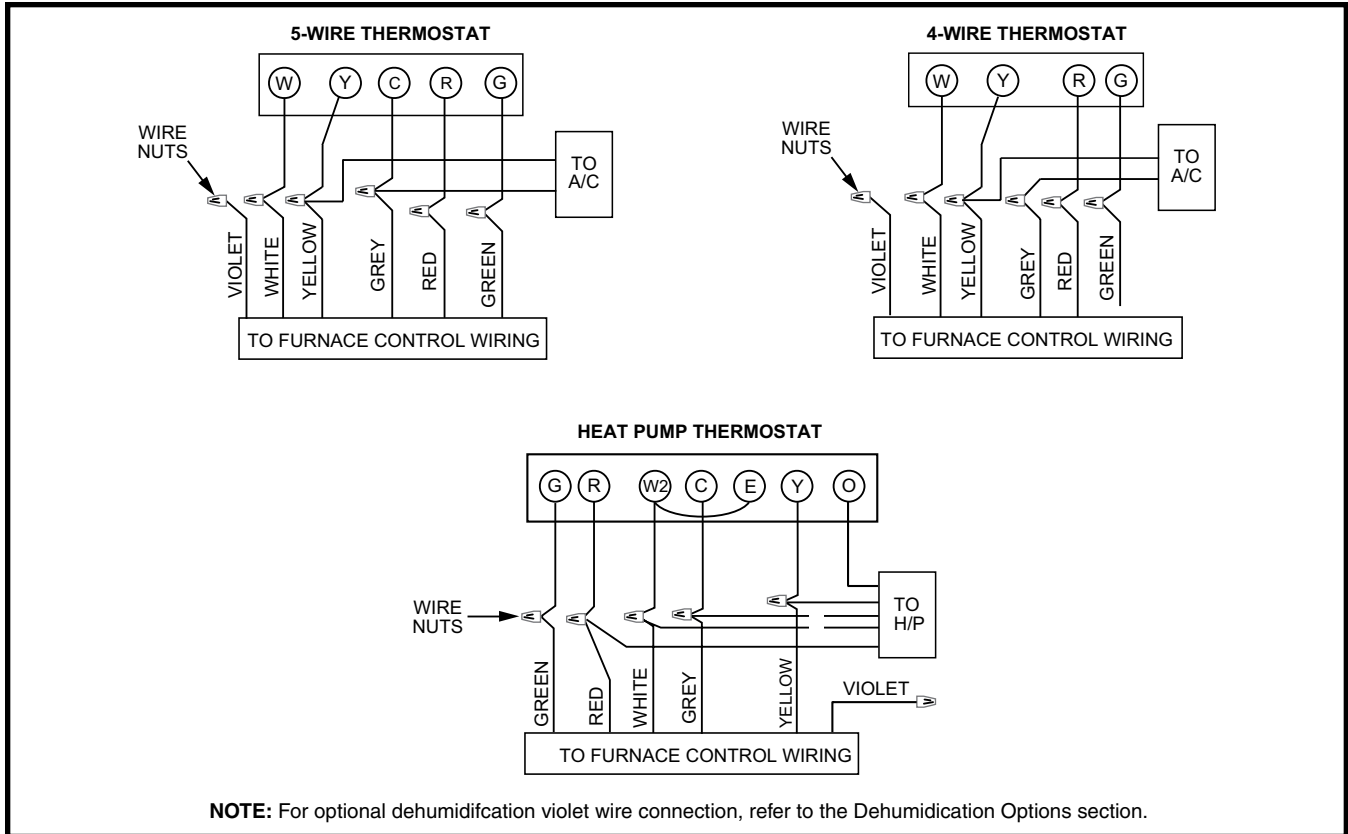
E7E*-0**H1	MAXIMUM HEATING AIRFLOW SETTING							
	E7EM				E7ED		E7EU	
	DOWNFLOW		UPFLOW		DOWNFLOW		UPFLOW	
	MH	RES	MH	RES	MH	RES	MH	RES
10	0001	0101	0001	0101	0101	0101	0101	0101
12		0011	0101					
15		0101						
17								
20								
23		0011	0001	0011	0001			0011

**NOTES:**

1. MH and Res represent Manufactured Housing and Residential (modular home) applications, respectively
2. To comply with government mandated efficiency standards, speed settings with higher CFM values than listed in this table are not allowed in HEAT mode

**Table 5. Maximum Allowable Heat Settings**

## Electrical Data & Diagrams



**Figure 20. E7 Thermostat Connection**

FURNACE MODELS E7-	010H	012H	015H	017H	020H	023H
Rated Heating Output, Btuh	35,000	41,000	53,000	57,000	70,000	75,000
Watts (Total kw, Heating Elements & Blower)	10.4	12.0	15.4	16.6	20.4	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)
Motor Speed, H.P. Rating, Amps	16 Speed, 1/2 HP, 3.6 A					
Test ESP, in. w.c. Max	0.3					
Optional Cooling Available with factory installed blower	2.0 - 4.0 Ton					
Optional Heat Pump Available with factory installed blower	2.0 - 4.0 Ton					
Air Filter (Standard)	18" x 20" x 1" (nominal)					
Furnace Dimensions	Multi-Poise	Width-20" (508mm), Height-29" (737mm), Depth-24 1/2" (623mm)				
	Upflow/Downflow	Width-20" (508mm), Height-60 5/8" (1546mm), Depth-24 1/2" (623mm)				

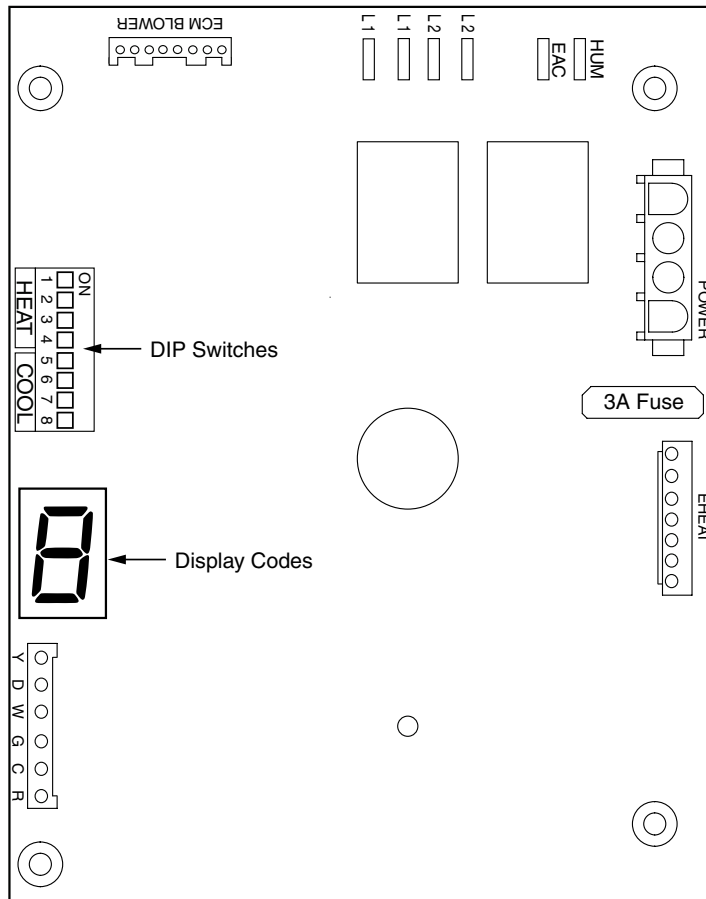
**NOTE:** Heating output rated at listed voltage.

**Table 6. Unit Specifications**

MODEL NUMBER E7E*-	SUPPLY CIRCUIT	TOTAL AMPERES	MAXIMUM OVER-CURRENT RATING	MINIMUM CIRCUIT AMPACITY
010H1	Single	45.3	60	57
012H1	Single	51.6	70	65
	Dual "A"	27.8	35	35
	Dual "B"	24.2	35	30
015H1	Single	66.1	90	83
	Dual "A"	45.3	60	57
	Dual "B"	20.8	30	26
017H1	Single	71.1	90	89
	Dual "A"	45.0	60	56
	Dual "B"	26.1	35	33
020H1	Single	86.9	110	109
	Dual "A"	45.3	60	57
	Dual "B"	41.7	60	52
023H1	Single	93.6	125	117
	Dual "A"	45.3	60	57
	Dual "B"	48.0	60	60

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

**Table 7. E7 Electrical Specifications**



**Figure 21. E7 Motor Control Board**

# WIRING DIAGRAM

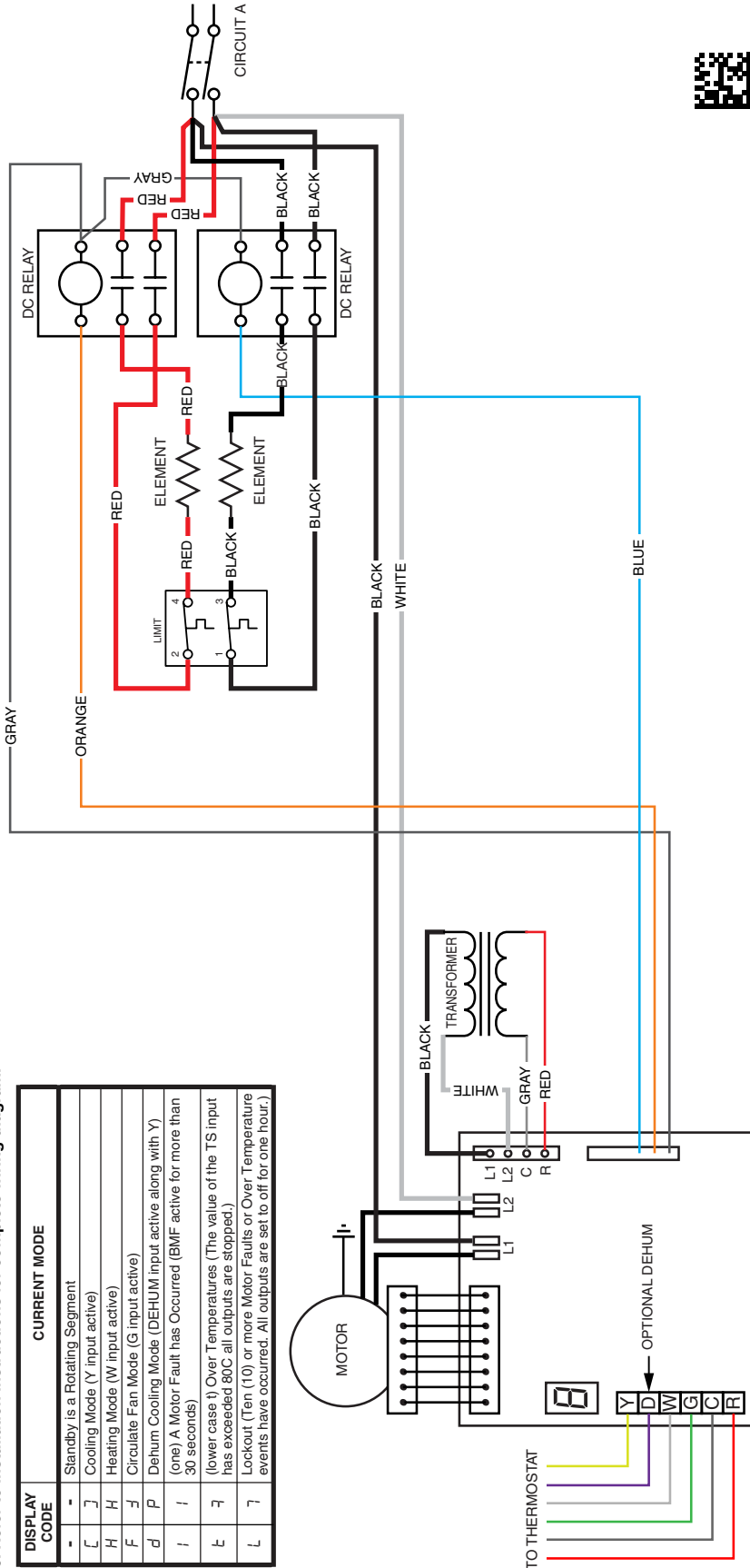
## Model: 10kW Electric Furnace with FSHE ECM 240VAC

1Ph/60HZ

- NOTES:**
1. Supply wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.
  2. To change blower speed refer to installation instructions
  3. Refer to furnace installation instructions for thermostat connections.
  4. If any wire in this unit is to be replaced it must be replaced with 105° C thermoplastic copper wire of the same gauge.
  5. Not suitable for use on systems exceeding 120V to ground.
  6. Refer to installation instructions for complete wiring diagram.

1. La taille du câblage d'alimentation doit être conforme à la révision applicable des codes NEC et des autres codes applicables.
2. Pour changer la vitesse du ventilateur, consultez les instructions d'installation.
3. Consultez les instructions d'installation de la fournaise pour les branchements du thermostat.
4. Si l'un ou l'autre des fils de cette unité requiert un remplacement, il doit être remplacé par un fil en cuivre thermoplastique 105 °C du même gabarit.
5. Ne convient pas à l'utilisation sur les systèmes qui excèdent 120 V à la terre.
6. Consultez les instructions d'installation pour un schéma de câblage complet.

DISPLAY CODE	CURRENT MODE
-	Standby is a Rotating Segment
[ J ]	Cooling Mode (Y input active)
H	Heating Mode (W input active)
F	Circulate Fan Mode (G input active)
d	Dehum Cooling Mode (DEHUM input active along with Y)
l	(one) A Motor Fault has Occurred (BMF active for more than 30 seconds)
l	(lower case l) Over Temperatures (The value of the TS input has exceeded 80C all outputs are stopped.)
L	Lockout (Ten (10) or more Motor Faults or Over Temperature events have occurred. All outputs are set to off for one hour.)



**LEGEND:**

- FIELD WIRING (dashed line)
- LOW VOLTAGE (thin solid line)
- HIGH VOLTAGE (thick solid line)

NOTE: DISPLAY CODE may be inverted depending on final installation orientation.



**1025721A**  
(Replaces 10257210)  
07/19



Figure 22. E7EB-010H Models



# WIRING DIAGRAM

## Model: 12kW Electric Furnace with FSHE ECM 240VAC

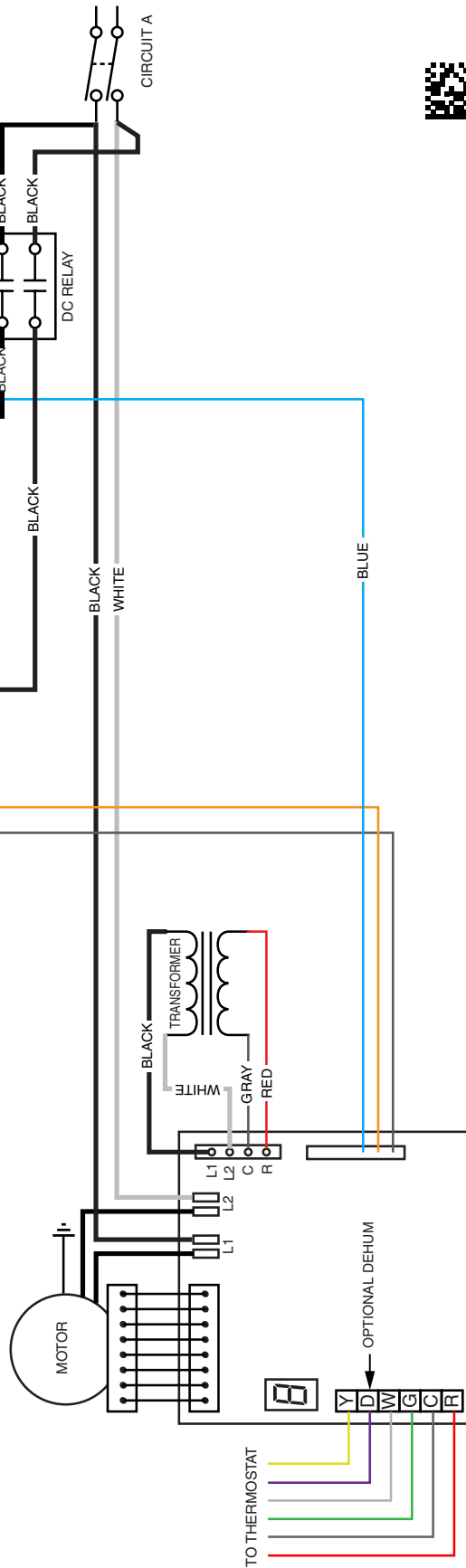
1Ph/60Hz

### NOTES:

1. Supply wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.
2. To change blower speed refer to installation instructions
3. Refer to furnace installation instructions for thermostat connections.
4. If any wire in this unit is to be replaced it must be replaced with 105°C thermoplastic copper wire of the same gauge.
5. Not suitable for use on systems exceeding 120V to ground.
6. Refer to installation instructions for complete wiring diagram.

1. La taille du câblage d'alimentation doit être conforme à la révision applicable des codes NEC et des autres codes applicables.
2. Pour changer la vitesse du ventilateur, consultez les instructions d'installation.
3. Consultez les instructions d'installation de la fournaise pour les branchements du thermostat.
4. Si l'un ou l'autre des fils de cette unité requiert un remplacement, il doit être remplacé par un fil en cuivre thermoplastique 105 °C du même gabarit.
5. Ne convient pas à l'utilisation sur les systèmes qui excèdent 120 V à la terre.
6. Consultez les instructions d'installation pour un schéma de câblage complet.

DISPLAY CODE	CURRENT MODE
-	Standby is a Rotating Segment
L	Cooling Mode (Y input active)
H	Heating Mode (W input active)
F	Circulate Fan Mode (G input active)
d	Dehumid Cooling Mode (DEHUM input active along with Y)
i	(one) A Motor Fault has Occurred (BMF active for more than 30 seconds)
l	(lower case l) Over Temperatures (The value of the TS input has exceeded 80C all outputs are stopped.)
L	Lockout (Ten (10) or more Motor Faults or Over Temperature events have occurred. All outputs are set to off for one hour.)



### LEGEND:

- FIELD WIRING
- LOW VOLTAGE
- HIGH VOLTAGE

NOTE: DISPLAY CODE may be inverted depending on final installation orientation.



**1025755A**  
(Replaces 10257550)  
07/19



Figure 23. E7EB-012H Models



# WIRING DIAGRAM

## Model: 17kw Electric Furnace with FSHE ECM

240VAC

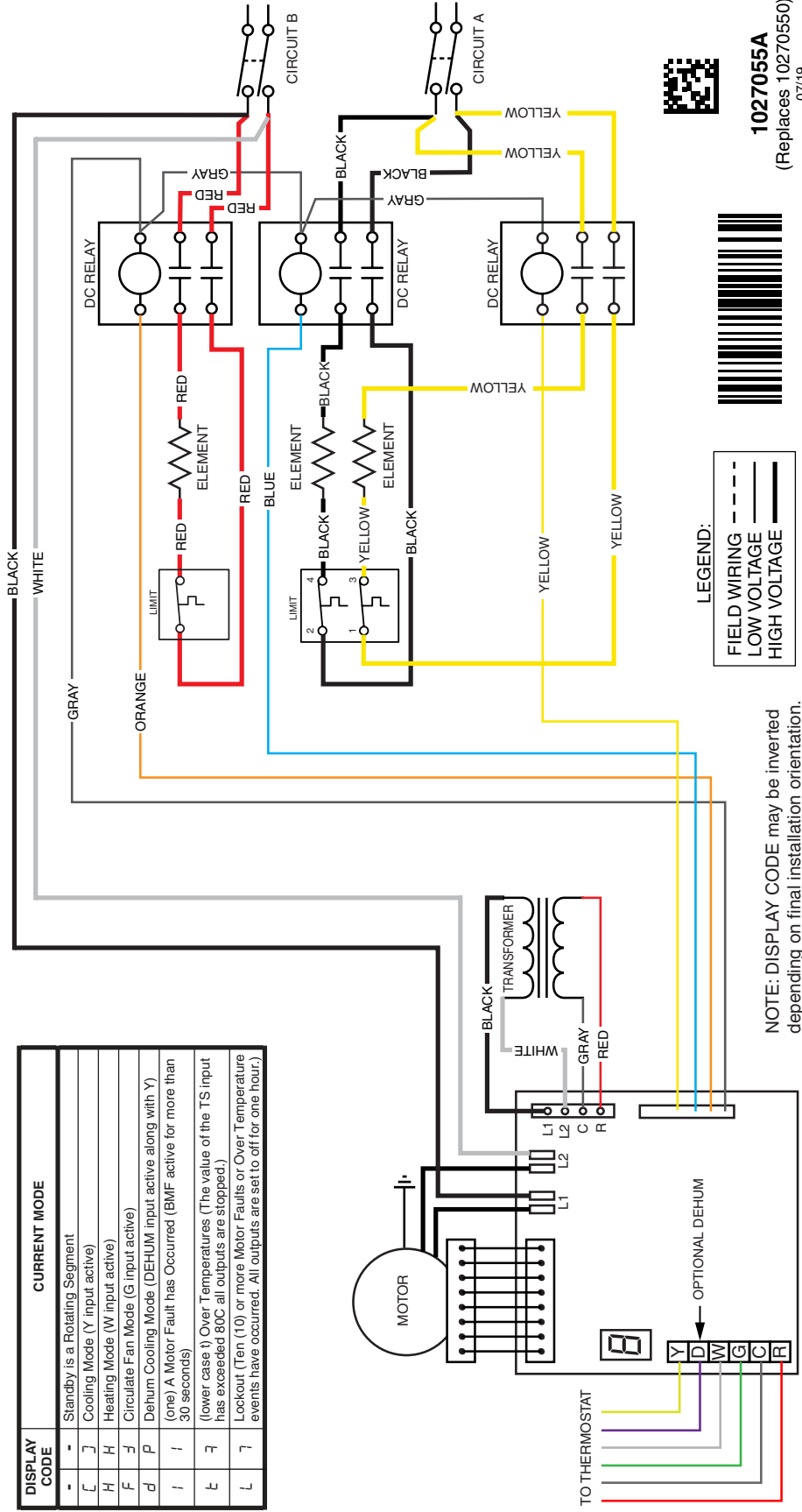
1Ph/60Hz

### NOTES:

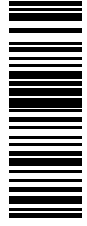
1. Supply wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.
2. To change blower speed refer to installation instructions
3. Refer to furnace installation instructions for thermostat connections.
4. If any wire in this unit is to be replaced it must be replaced with 105°C thermoplastic copper wire of the same gauge.
5. Not suitable for use on systems exceeding 120V to ground.
6. Refer to installation instructions for complete wiring diagram.

1. La taille du câblage d'alimentation doit être conforme à la révision applicable des codes NEC et des autres codes applicables.
2. Pour changer la vitesse du ventilateur, consultez les instructions d'installation.
3. Consultez les instructions d'installation de la fournaise pour les branchements du thermostat.
4. Si l'un ou l'autre des fils de cette unité requiert un remplacement, il doit être remplacé par un fil en cuivre thermoplastique 105 °C du même gabarit.
5. Ne convient pas à l'utilisation sur les systèmes qui excèdent 120 V à la terre.
6. Consultez les instructions d'installation pour un schéma de câblage complet.

DISPLAY CODE	CURRENT MODE
-	Standby is a Rotating Segment
L	Cooling Mode (Y input active)
H	Heating Mode (W input active)
F	Circulate Fan Mode (G input active)
d	Dehumid Cooling Mode (DEHUM input active along with Y)
i	(one) A Motor Fault has Occurred (BMF active for more than 30 seconds)
7	(lower case t) Over Temperatures (The value of the TS input has exceeded 80C all outputs are stopped.)
L	Lockout (Ten (10) or more Motor Faults or Over Temperature events have occurred. All outputs are set to off for one hour.)



NOTE: DISPLAY CODE may be inverted depending on final installation orientation.



1027055A  
(Replaces 10270550)  
07/19



Figure 25. E7EB-017H Models

# WIRING DIAGRAM

**Model: 20kW and 23kW Electric Furnace with FSHE ECM**

**240VAC**

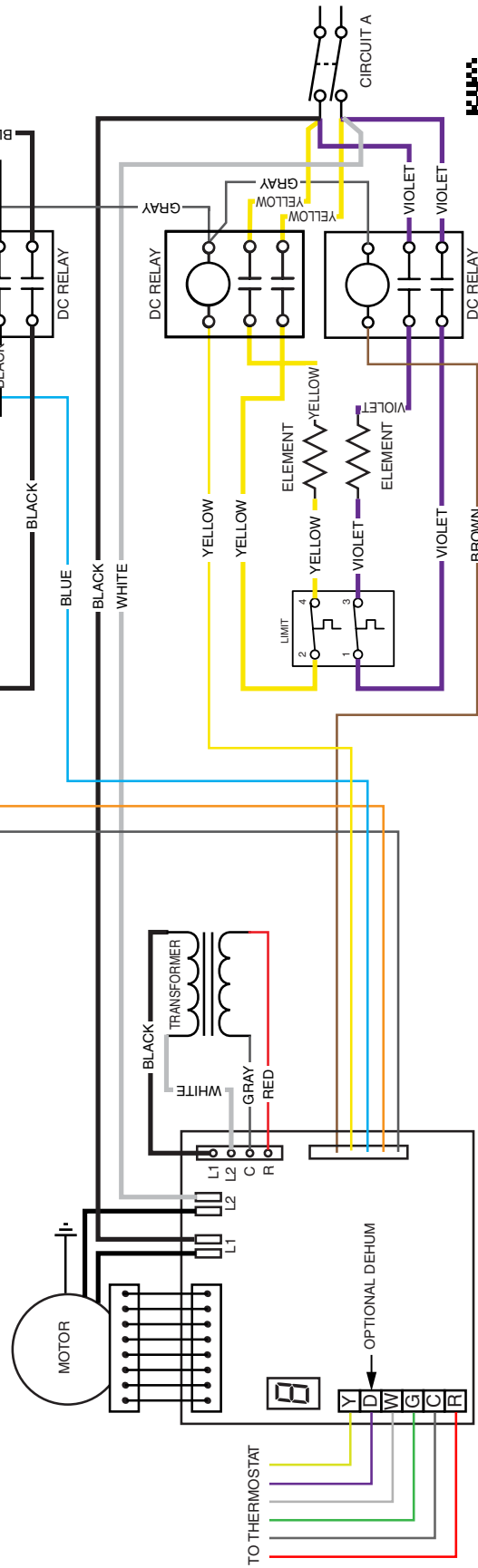
**1Ph/60Hz**

**NOTES:**

1. Supply wire size must be in accordance to the applicable revision of the NEC and all other applicable codes.
2. To change blower speed refer to installation instructions.
3. Refer to furnace installation instructions for thermostat connections.
4. If any wire in this unit is to be replaced it must be replaced with 105°C thermoplastic copper wire of the same gauge.
5. Not suitable for use on systems exceeding 120V to ground.
6. Refer to installation instructions for complete wiring diagram.

1. La taille du câblage d'alimentation doit être conforme à la révision applicable des codes NEC et des autres codes applicables.
2. Pour changer la vitesse du ventilateur, consultez les instructions d'installation.
3. Consultez les instructions d'installation de la fournaise pour les branchements du thermostat.
4. Si l'un ou l'autre des fils de cette unité requiert un remplacement, il doit être remplacé par un fil en cuivre thermoplastique 105 °C du même gabarit.
5. Ne convient pas à l'utilisation sur les systèmes qui excèdent 120 V à la terre.
6. Consultez les instructions d'installation pour un schéma de câblage complet.

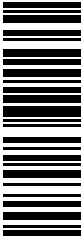
DISPLAY CODE	CURRENT MODE
-	Standby is a Rotating Segment
L J	Cooling Mode (Y input active)
H	Heating Mode (W input active)
F F	Circulate Fan Mode (G input active)
d P	Dehum Cooling Mode (DEHUM input active along with Y)
f I	(one) A Motor Fault has Occurred (BMF active for more than 30 seconds)
£ 7	(lower case t) Over Temperatures (The value of the TS input has exceeded 80C, all outputs are stopped.)
L 7	Lockout (Ten (10) or more Motor Faults or Over Temperature events have occurred. All outputs are set to off for one hour.)



**LEGEND:**

- FIELD WIRING (dashed line)
- LOW VOLTAGE (solid line)
- HIGH VOLTAGE (thick solid line)

NOTE: DISPLAY CODE may be inverted depending on final installation orientation.



**1025723A**  
(Replaces 10257230)  
07/19



Figure 26. E7EB-020H & E7EB-023H Models

CONTROL SIGNAL & MODE	OPERATION	TOTAL KW	BOARD ACTION
<b>W HEAT</b>	<b>ON</b>	10	Stage 1 Heat on immediately
			HEAT Blower on after 3 second delay
			Stage 2 heat on after 10 second delay
		12	Stage 1 Heat on immediately
			HEAT Blower on after 3 second delay
			Stage 2 heat on after 10 second delay
		15	Stage 1 Heat on immediately
			HEAT Blower on after 3 second delay
			Stage 2 heat on after 10 second delay
			Stage 3 heat on after 20 second delay
		17	Stage 1 Heat on immediately
			HEAT Blower on after 3 second delay
			Stage 2 heat on after 10 second delay
			Stage 3 heat on after 20 second delay
		20	Stage 1 Heat on immediately
			HEAT Blower on after 3 second delay
			Stage 2 heat on after 10 second delay
			Stage 3 heat on after 20 second delay
	Stage 4 heat on after 30 second delay		
23	Stage 1 Heat on immediately		
	HEAT Blower on after 3 second delay		
	Stage 2 heat on after 10 second delay		
	Stage 3 heat on after 20 second delay		
	Stage 4 heat on after 30 second delay		
<b>OFF</b>	-	Heat stages off immediately	
		Blower turns off after 15 second delay	
<b>W &amp; Y AUX HEAT</b>	<b>ON</b>	10	Stage 1 Heat on immediately
			Blower on after 3 second delay (HEAT or COOL speed, whichever is greater)
			Stage 2 heat on after 10 second delay
		12	Stage 1 Heat on immediately
			Blower on after 3 second delay (HEAT or COOL speed, whichever is greater)
			Stage 2 heat on after 10 second delay
		15	Stage 1 Heat on immediately
			Blower on after 3 second delay (HEAT or COOL speed, whichever is greater)
			Stage 2 heat on after 10 second delay
			Stage 3 heat on after 20 second delay
		17	Stage 1 Heat on immediately
			Blower on after 3 second delay (HEAT or COOL speed, whichever is greater)
			Stage 2 heat on after 10 second delay
			Stage 3 heat on after 20 second delay
		20	Stage 1 Heat on immediately
			Blower on after 3 second delay (HEAT or COOL speed, whichever is greater)
			Stage 2 heat on after 10 second delay
			Stage 3 heat on after 20 second delay
			Stage 4 heat on after 30 second delay
		23	Stage 1 Heat on immediately
Blower on after 3 second delay (HEAT or COOL speed, whichever is greater)			
Stage 2 heat on after 10 second delay			
Stage 3 heat on after 20 second delay			
Stage 4 heat on after 30 second delay			

**Table 8. Control Board Operation**



CONTROL SIGNAL & MODE	OPERATION	TOTAL KW	BOARD ACTION
W & Y AUX HEAT (Continued)	OFF	-	Heat stages off immediately
			Blower turns off after 15 second delay
G FAN	ON	-	Blower on immediately (35% of COOL)
	OFF	-	Blower off immediately
Y HEAT PUMP AND COOL	ON	-	COOL blower on immediately
	OFF	-	COOL blower off after 40 second delay
Y & D COOL WITH DEHUM	ON	-	70% COOL blower on immediately
			100% COOL blower after 10 minutes
	OFF	-	COOL blower off after 40 second delay

**Table 8. Control Board Operation - Continued**

### INSTALLATION CHECKLIST

<b>INSTALLER NAME:</b>		
CITY:	STATE:	
<b>INSTALLATION ADDRESS:</b>		
CITY:	STATE:	
UNIT MODEL #		
UNIT SERIAL #		
Minimum clearances as shown in Table 1 (page 3)?	YES	NO
Has the owner's information been reviewed with the homeowner?	YES	NO
Has the literature package been left near the furnace?	YES	NO

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

COMBUSTION AIR & VENTING SYSTEM		
Is there adequate fresh air supply for ventilation?	YES	NO
Filter(s) secured in place?	YES	NO
Filter(s) clean?	YES	NO



We Encourage Professionalism



Through Technician Certification by NATE

**Intertek**

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



**10349280**

(Replaces 10349580)