

INSTALLATION INSTRUCTIONS

EFV Electric Furnace

Indoor Modular Air System

Electric Heat

This manual must be left with the homeowner for future reference.

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SAFETY CONSIDERATIONS

Your safety and the safety of others are very important.

We have provided many important safety messages in this manual and on your appliance. Always read and obey all safety messages.

This is the safety alert symbol.

This symbol alerts you to potential hazards that can kill or hurt you and others.



All safety messages will follow the safety alert symbol and signal word. These signals words mean the following:

DANGER: You can be **killed or seriously injured** if you don't immediately follow

instructions.

WARNING: Indicate a potentially hazardous. situation which, if not avoided, could result in **death or serious injury**.

CAUTION: Indicate a potentially hazardous situation which, if not avoided, could result in **minor or moderate injury**. Caution may also be used to alert against unsafe practices.

NOTICE: Indicates a statement of company policy as the message relates directly or indirectly to the safety of personnel or protection of property.

IMPORTANT: More detailed information concerning the statement of company policy as the message relates directly or indirectly to the safety of personnel or protection of property.

all safety messages will tell you what the potential hazard is tell you how to reduce the change of injury, and tell you what can happen if the instructions are not followed.



Manufactured By
Allied Air Enterprises LLC
 215 Metropolitan Drive
 West Columbia, SC 29170



Save these instructions for future reference

⚠ CAUTION

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised ensure that they do not play with the appliance.

⚠ NOTICE

This unit is a PARTIAL UNIT AIR CONDITIONER, complying with PARTIAL UNIT requirements of this Standard, and must only be connected to other units that have been confirmed as complying to corresponding PARTIAL UNIT requirements of this Standard, UL 60335-2-40/CSA C22.2 No. 60335-2-40, or UL 1995/CSA C22.2 No 236.

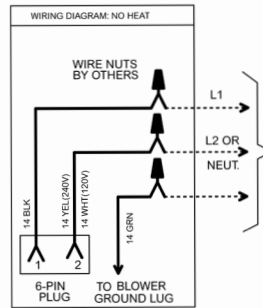
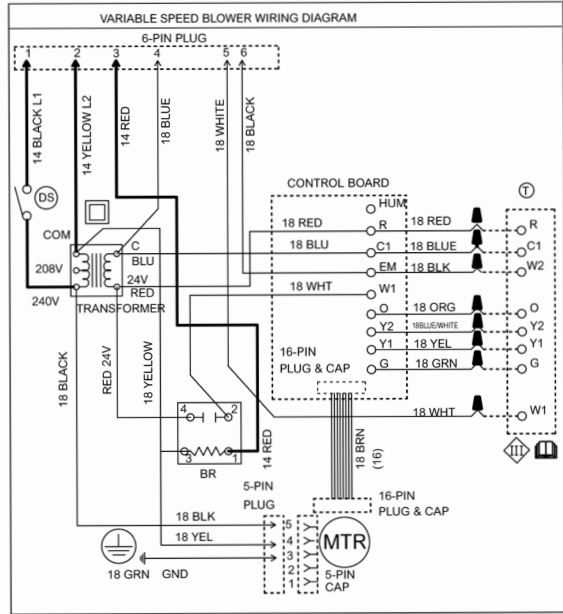
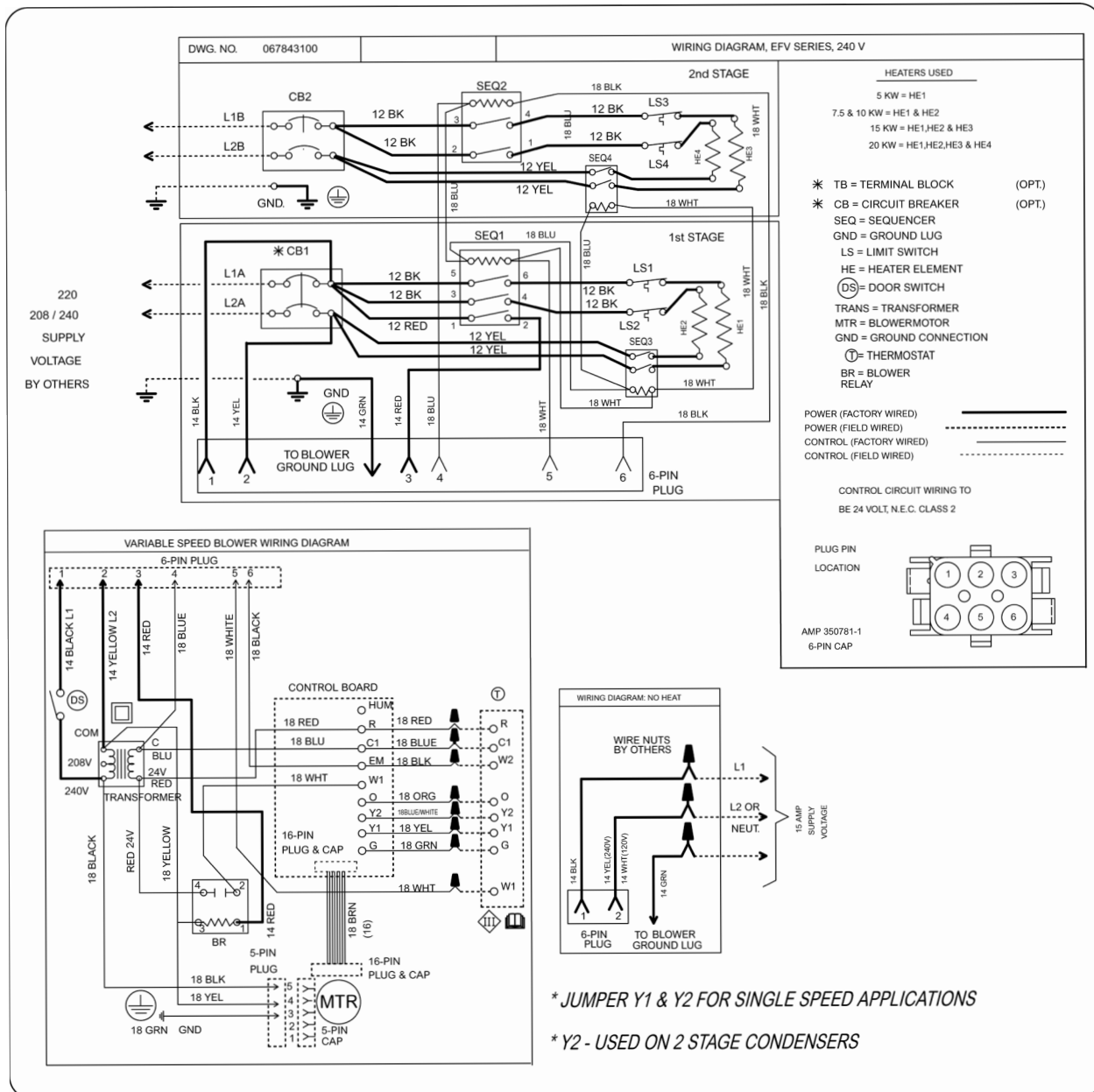
⚠ IMPORTANT

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

⚠ NOTICE

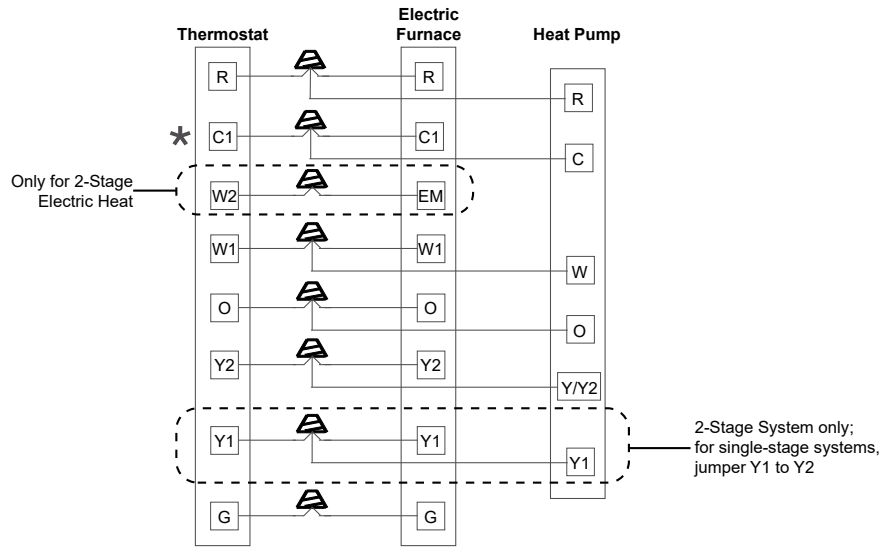
Ducts connected to an appliance shall not contain a potential ignition source.

WIRING DIAGRAMS

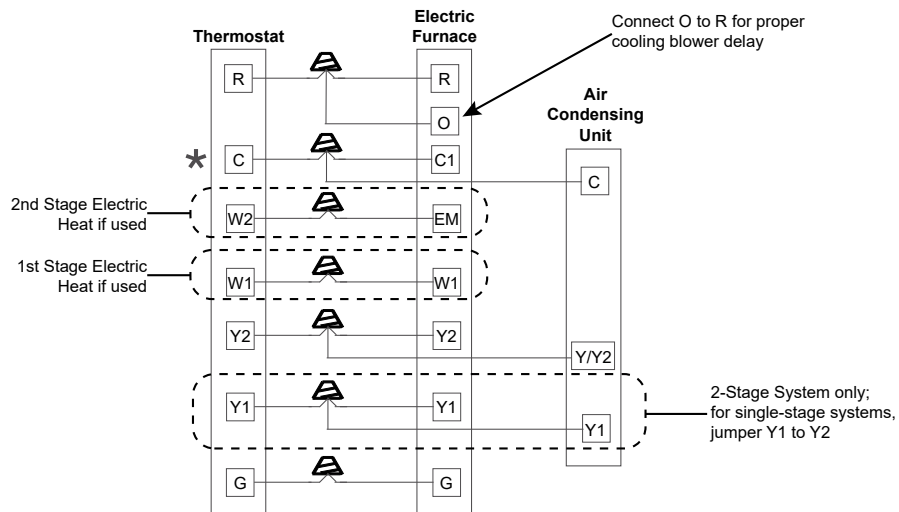


* JUMPER Y1 & Y2 FOR SINGLE SPEED APPLICATIONS
* Y2 - USED ON 2 STAGE CONDENSERS

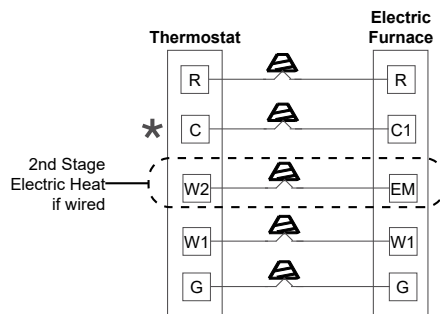
Heat Pump with Electric Heat



Air Conditioning with or without Electric Heat



Heat Only



★ Connect common wired to thermostat only if required. See thermostat instructions.

FIGURE 1.

Unit Size	Total Heating capacity	Heating Cap.		Circuit 208V	Blower Amps (A)		Total Amps per Circuit (A)		Minimum Circuit Ampacity (A)		Maximum Overcurrent Protection		Single Point Power Supply-MCA (A)		Single Point Power Supply-MOP (A)	
		kW	Btuh		208V	240V	208V	240V	208V	240V	208V	240V	208V	240V	208V	240V
		240V	240V													
8	0	0	0	1	2.60	2.40	2.6	2.4	3.3	3.0	15	15	---	---	---	---
	5	5	17,061	1	2.60	2.40	20.7	23.2	25.8	29.0	30	30	---	---	---	---
	7.5	7.5	25,591	1	2.60	2.40	29.7	33.7	37.1	42.1	40	45	---	---	---	---
	10	10	34,121	1	2.60	2.40	38.7	44.1	48.4	55.1	50	60	---	---	---	---
12	0	0	0	1	2.90	2.70	2.9	2.7	3.6	3.4	15	15	---	---	---	---
	5	5	17061	1	2.90	2.70	21.0	23.5	26.2	29.4	30	30	---	---	---	---
	7.5	7.5	25,591	1	2.90	2.70	30.0	34.0	37.5	42.4	40	45	---	---	---	---
	10	10	34,121	1	2.90	2.70	39.0	44.4	48.8	55.5	50	60	---	---	---	v
	15	10	34,121	1	2.90	2.70	39	44.4	48.8	55.5	50	60	71.3	81.5	80	90
		5	17,061	2	0.00	0.00	18.1	20.8	22.6	26.0	25	30				
16	0	0	0	1	3.80	3.40	3.8	3.4	4.8	4.3	15	15	---	---	---	---
	10	10	34,121	1	3.80	3.40	39.9	45.1	49.9	56.3	50	60	---	---	---	---
	15	10	34,121	1	3.80	3.40	39.9	45.1	49.9	56.3	50	60	72.5	82.4	80	90
		5	17,061	2	0.00	0.00	18.1	20.8	22.6	26.0	25	30				
	20	10	34,121	1	3.80	3.40	39.9	45.1	49.9	56.3	50	60	95.0	108.4	100	110
		10	34,121	2	0.00	0.00	36.1	41.7	45.1	52.1	50	60				
20	0	0	0	1	4.70	4.20	4.7	4.2	5.9	5.3	15	15	---	---	---	---
	10	10	34,121	1	4.70	4.20	40.8	45.9	51.0	57.3	60	60	---	---	---	---
	15	10	34,121	1	4.70	4.20	40.8	45.9	51.0	57.3	60	60	73.6	83.4	80	90
		5	17,061	2	0.00	0.00	18.1	20.8	22.6	26.0	25	30				
	20	10	34,121	1	4.70	4.20	40.8	45.9	51.0	57.3	60	60	96.2	109.4	100	110
		10	34,121	2	0.00	0.00	36.1	41.7	45.1	52.1	50	60				

KW packages in ***bold italics*** indicate that these heat packages require and include circuit breakers; circuit breakers are optional for all other models.

(1) For 208 Volts use .751 correction factor for KW & BTUH.

BLOWER PERFORMANCE (EFV MODELS)

Model	Energized Thermostat Terminal	Control Board Tap	CFM @ ESP. in W.C.								
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	
EFV08BC	Y1	A	710	690	680	690	690	690	690	690	690
		B	560	560	560	570	560	560	570	570	570
		C	490	490	500	500	500	500	490	490	490
		D	430	430	430	430	440	440	440	440	440
	Y1/Y2	A	1010	980	970	980	980	980	980	980	970
		B	800	800	800	810	800	800	810	810	810
		C	700	700	710	710	710	710	700	700	700
		D	610	610	620	620	630	630	630	630	630
	G	A	510	490	480	420	420	490	490	490	490
		B	400	400	400	410	400	400	410	410	410
		C	350	350	360	360	360	360	350	350	350
		D	310	310	310	310	320	320	320	320	320
EFV12BC	Y1	A	850	860	860	870	880	880	880	880	880
		B	710	720	730	740	740	750	730	730	730
		C	620	600	600	600	610	600	610	610	610
		D	500	480	470	470	460	450	440	420	420
	Y1/Y2	A	1,220	1,220	1,210	1,210	1,210	1,210	1,200	1,200	1,200
		B	1,000	1,010	1,040	1,040	1,040	1,040	1,040	1,020	1,020
		C	820	820	830	830	840	840	840	840	840
		D	650	640	640	650	650	660	660	640	640
	G	A	640	620	640	640	640	640	630	630	630
		B	570	560	560	550	560	550	520	520	520
		C	510	500	420	480	470	460	440	430	430
		D	470	450	440	410	400	400	320	380	380

BLOWER PERFORMANCE (EFV MODELS)										
Model	Energized Thermostat Terminal	Control Board Tap	CFM @ ESP. in W.C.							
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80
EFV16BC	Y1	A	1,130	1,120	1,120	1,110	1,100	1,090	1,080	1,070
		B	990	970	960	960	940	920	900	910
		C	850	830	810	790	780	750	740	710
		D	690	660	650	620	610	580	560	530
	Y1/Y2	A	1,680	1,660	1,640	1,620	1,610	1,610	1,610	1,600
		B	1,440	1,400	1,400	1,400	1,390	1,380	1,380	1,360
		C	1,230	1,220	1,210	1,210	1,200	1,180	1,170	1,160
		D	1,000	990	980	980	960	950	950	940
	G	A	800	790	760	750	720	710	680	660
		B	680	670	650	630	610	580	550	520
		C	580	540	510	480	460	430	390	370
		D	480	430	390	410	400	400	400	400
EFV20BC	Y1	A	1,250	1,230	1,210	1,180	1,140	1,100	1,070	1,050
		B	1,120	1,100	1,080	1,040	990	970	940	930
		C	980	950	900	860	840	820	810	800
		D	860	810	760	740	720	710	700	680
	Y1/Y2	A	1,840	1,830	1,810	1,790	1,780	1,760	1,730	1,690
		B	1,640	1,640	1,620	1,610	1,600	1,570	1,540	1,490
		C	1,390	1,380	1,370	1,360	1,322	1,296	1,255	1,220
		D	1,290	1,190	1,180	1,140	1,100	1,040	1,030	1,000
	G	A	910	870	830	790	770	760	740	730
		B	840	790	740	710	710	690	680	660
		C	740	690	640	640	620	610	600	590
		D	680	610	580	570	560	550	530	500

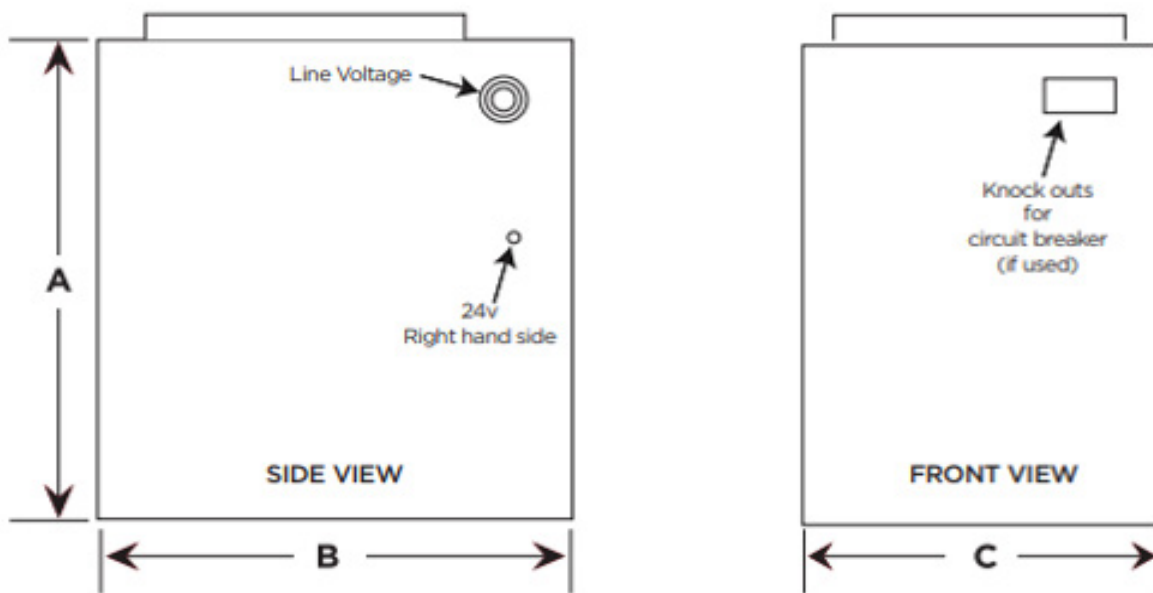
NOTE:

1. Tap A is the factory default for both heating and cooling.
2. Different speeds may be set for heating or cooling mode. Refer to blower table on page 16 for information on changing speeds and minimum settings on electric heat.
3. Maximum electric heat kit size for EFV08 is 10 KW. Maximum electric heat size for EFV12 is 15 KW.
4. 15KW and 20KW (2 stage models) require 2 supply circuits. Circuit #1 includes blower motor amps.

DIMENSIONS

Unit size	A	B	C	SUPPLY DUCT OPENING		RETURN DUCT OPENING	
				Depth	Width	Depth	Width
EFV08	25	21	17-1/2	16-1/2	15-1/2	19-1/2	16
EFV12	25	21	17-1/2	16-1/2	15-1/2	19-1/2	16
EFV16	26	21	21	16-1/2	19	19-1/2	19-1/2
EFV20	26	21	24-1/2	16-1/2	22-1/2	19-1/2	23

Optional line voltage on top or right side of blower.



GENERAL

The EFV Electric Furnace is designed for ease of installation, featuring horizontal, upflow, and downflow (counterflow) applications. The units are shipped from the factory completely assembled. Accessories may also be ordered as field-installed items. All models are designed for indoor installations only.

These instructions are intended as a general guide only and do not supersede any local, state, or national codes in any way. Compliance with all local, state, or national codes pertaining to this type of equipment should be determined prior to installation. Read the entire instruction manual as well as the instructions supplied in separate equipment before starting the installation. Several of the installation steps can be done prior to setting the unit in place and doing this can save time and simplify installation. Improper installations not following these instructions can result in unsatisfactory operation and/or dangerous conditions and

may void the unit warranty. Following these instructions can result in unsatisfactory operation and/or dangerous conditions and may void the unit warranty.

Upon receipt of equipment, carefully inspect it for possible shipping damage. If damage is found, it should be noted on the carrier's freight bill. Take special care to examine the unit inside the carton if the carton is damaged. Any concealed damage discovered should be reported to the last carrier immediately, preferably in writing, and should include a request for inspection by the carrier's agent.

If any damages are discovered and reported to the carrier **DO NOT INSTALL THE UNIT**, as claim may be denied.

Check the unit rating plate to confirm specifications are as ordered.

TOOLS AND PARTS

Gather the required tools and parts before starting installation. Read and follow the instructions provided with any tools listed here.

Tools Needed

1/4" nut driver	Tape Measure
Level	Hammer
Screwdriver	Sealant
Adjustable wrench	UL listed wire nuts

Parts Needed

Check local codes, check existing electrical supply, and read "Ductwork Requirements," and "Electrical Requirements," before purchasing parts.

INSTALLATION REQUIREMENTS

The installation of the blower section, field wiring, warm air ducts, etc. must conform to the requirements of the National Electrical Code, ANSI/NFPA No. 70 (latest edition) in the United States, and any state laws, and local ordinances (including plumbing or wastewater codes). Local authorities having jurisdiction should be consulted before installation is made. Such applicable regulations or requirements take precedence over the general instructions in this manual.

Install the conditioned air plenum, ducts and air filters (not provided) in accordance with NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems (latest edition). The blower section is provided with flanges for the connection of the plenum and ducts. Air filters must be listed as Class 2 furnace air filters. The blower section is shipped from the factory completely assembled.

Do not remove the cabinet knockouts until it has been determined which knockouts will need to be removed for the installation.

Select the final installation position that best suits the site conditions. Consider required clearances, space, and routing requirements for refrigerant line, condensate



⚠ WARNING

Electrical Shock

Disconnect power before servicing.
Replace all parts and panels before operating.
Electrically ground air handler.
Connect ground wire to ground terminal marked.
Failure to do so can result in death or electrical shock.

Explosion Hazard

Keep flammable materials and vapors, such as gasoline, away from this unit.
Place this unit so that the heating elements are at least 18in (46cm) above the floor for a garage insulation.
Failure to follow these instructions can result in death, explosion or fire.



disposal, filters, ductwork, wiring, and accessibility for service. Refer to the rating plate on the blower section for specific information.

LOCATION REQUIREMENTS

NOTE: When the unit is installed in a very humid space and used in cooling applications, excessive sweating may occur on outside of unit. To prevent excessive sweating wrap unit with 1" fiberglass insulation. All openings should be sealed to prevent air leakage that could cause condensate to form inside the cabinet.

- If installed in an unconditioned space, sealant should be applied around the electrical wires, refrigerant tubing, and condensate lines where they enter the cabinet.
- Electrical wires should be sealed on the inside where they exit the conduit opening. Sealant is required to prevent air leakage and from condensate from forming inside the blower, control box, and on the electrical controls.
- The blower and its complementing coil must be installed in such a way as to allow free access to the blower/control compartment.

- The blower and its complementing coil must be installed with a $\frac{3}{4}$ " drop in the horizontal position towards the drain pan to ensure proper condensate drainage. The blower and coil should also be tilted $\frac{1}{2}$ " from back to front toward the drain line.
- All electric furnaces installed with a mating coil section must follow the instructions proper condensate drainage. It is recommended that the auxiliary drain be connected to a drain line for all units. If the auxiliary drain is not connected, it must be plugged with provided cap. For counter flow units, the auxiliary drain must be connected and routed to a drain.

IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFCs, HCFCs and HFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance.

INSTALLATION CLEARANCES

Non-Ducted Return Closet Installation

- Clearances to combustible material to be 0 inches to unit casing, and 0 inches to plenum and duct for first 36 inches.
- Verify and Maintain all required clearances to combustible surfaces as stated on the unit rating plate
- The blower and coil can be installed in a closet with a false bottom to form a return air plenum or be installed with a return air plenum under the coil section.

- Louvers or return air grilles are field supplied. Local codes may limit application of systems without a ducted return to single-story buildings.
- For a unit installed in a closet with a louvered return opening, comply with the minimum open area in the "Ductwork Requirements" section.

INSTALLATION CONFIGURATIONS

For ease in installation, it is best to make any necessary coil configuration changes before connecting the electric furnace to the coil.

NOTE: Read and follow coil installation instructions to ensure proper installation of refrigerant lines and drain connections.

Vertical Installations

Upflow

The blower should be set on top of the coil section being used and the blower must be supported on the bottom only and set on solid floor or a field supplied supporting frame.

Downflow

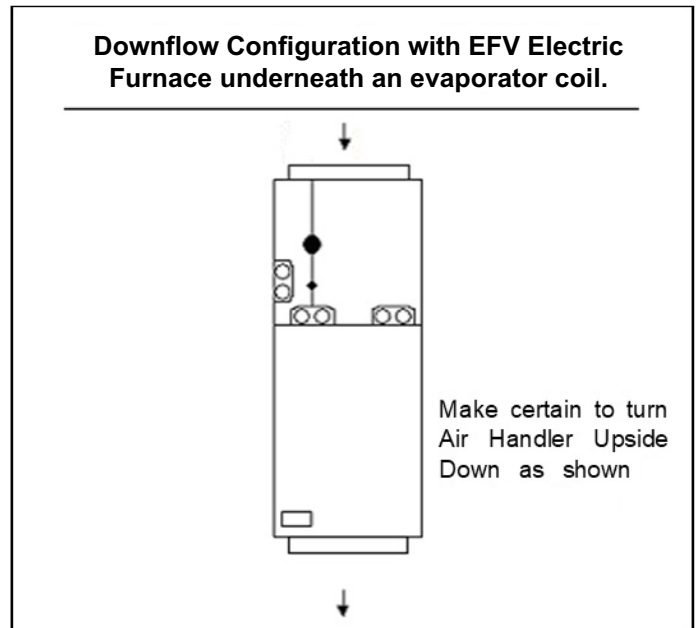
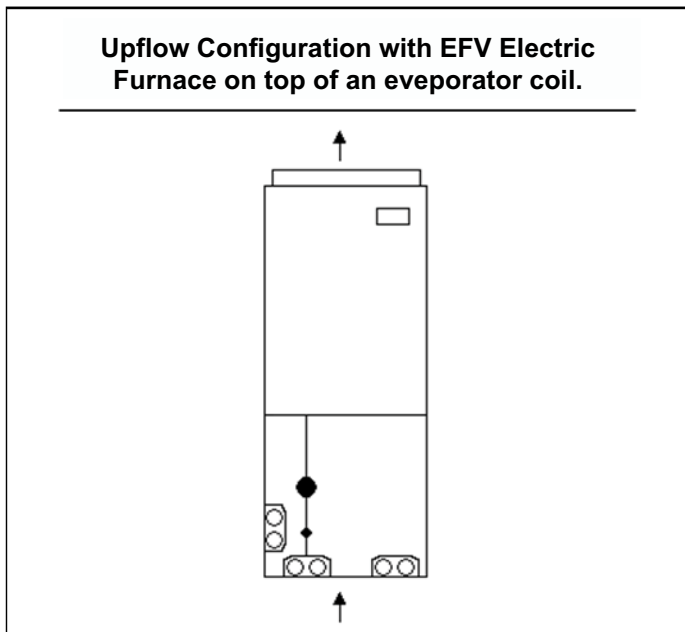
Turn the Electric Furnace upside down and place the evaporator coil on top of the blower. Install the two supporting brackets (support brackets are included with all

EFV models) between the Electric Furnace and Evaporator Coil to ensure a proper fit between the two pieces of equipment. The blower must be supported on the bottom only and set on a solid floor or a field supplied supporting frame.

1. Ensure the blower section matches the coil being used.
2. The bottom of the blower section contains a $\frac{1}{2}$ gasket. Check to make sure gasket is attached to the bottom of the blower section.
3. Position the blower section over the coil opening or under the coil depending on your desired configuration.
4. To secure the Electric Furnace fasten the duct flanges of coil with screws to the duct flanges of the blower section.

INSTALLATION CONFIGURATIONS CONT.

Vertical Installations cont.



Horizontal Installations

Horizontal installations can be left-hand or right-hand air supplied. Adequate support must be provided to ensure cabinet integrity. Ensure that there is adequate room to remove service and access panels if installing in the horizontal position. Refer to instructions provided with coil for proper horizontal installations .

IMPORTANT:

- Refer to the instructions provided with the coil being used to determine how the secondary drain should be trapped and piped.
- When an evaporator coil is installed in an attic or above a finished ceiling, an auxiliary drain pan should be provided under the EFV Electric Furnace and coil as specified by most local building codes.

Conversion from Vertical to Horizontal

The EFV Electric Furnace can be converted from operating in a vertical to a horizontal position by installing supporting brackets (included with all EFV Models) between the two pieces of equipment. A horizontal condensate drain pan (not included with the EFV Electric Furnace) would also be needed. Maintain all required clearances to combustible surfaces as stated on the unit rating plate.

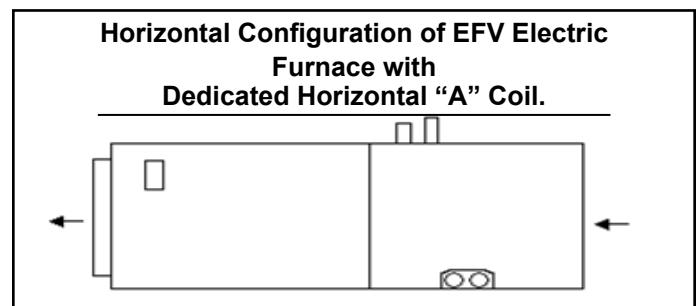
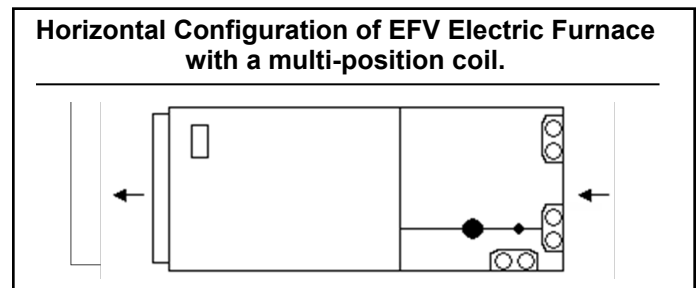
Suspended Cabinet Installation

NOTE: Unit must be positioned with one side parallel to the floor when in the horizontal position.

The suspending means must be field fabricated, and should consist of a minimum of two "cradles" made by

attaching two 3/8" all thread rods to a length 1-5/8" x 7/8" unistrut. Cradles should not interfere with panel removal, drain connections, or refrigerant connections.

1. Ensure the proper blower section matches the coil.
2. The bottom of the blower section contains a ^{1/2} gasket. Check to make sure gasket is attached to the bottom of the blower section.
3. Position the blower section up against the coil opening.
4. Fasten duct flanges of coil to duct flanges of blower section with screws to secure EFV Electric Furnace.



DUCTWORK REQUIREMENTS

- Install the conditioned air plenum, ducts and air filters (not provided) in accordance with NFPA 90B Standard for the installation of Warm Air Heating and Air-Conditioning Systems (latest edition).
- The EFV Electric Furnace is provided with flanges for the connection of the plenum and ducts.
- Air filters must be listed as Class 2 furnace air filters.

Supply and return ductwork must be adequately sized to meet the system's air requirements and static pressure capabilities. Ductwork should be insulated with a minimum of 1" thick insulation with a vapor barrier in conditioned areas or 2" minimum in unconditioned areas. Connect supply air duct to the flange on top of the unit. If an isolation connector is used, it must be non-flammable.

Sheet metal ductwork run in unconditioned spaces must be insulated and covered with a vapor barrier. Fibrous ductwork may be used if constructed and installed in accordance with SMACNA Construction Standard on Fibrous Glass Ducts. Check local codes for requirements on ductwork and insulation.

Duct system must be designed within the range of external static pressure the unit is designed to operate against. It is important that the system airflow be adequate. Make sure supply and return ductwork, grills, special filters, accessories, etc. are accounted for in total resistance.

Supply plenum is attached to the duct flanges supplied on the unit around the blower outlet.

Supply plenum should be the same size as the flanged opening provided around the blower outlet and should be installed as recommended in ASHRAE or ACCA Manual D.

The plenum forms an extension of the blower housing and minimizes air expansion losses from the blower.

If an elbow is included in the plenum close to the unit, it must not be smaller than the dimensions of the supply duct flange on the unit.

Non-Ducted Return Closet Installation

The cabinet can be installed in a closet with a false bottom to form a return air plenum or be installed with a return air plenum under the unit. Louvers or return air grilles are field supplied. Local codes may limit application of systems without a ducted return to single story buildings.

- Install louvers in a closet. Use the free area of louver or grille to determine the size opening required to provide the free area for metal louvers or grilles.
- If the free area is not known, assume a 25% free area for wood or a 75% free area for metal louvers or grilles.
- If the return air plenum is used, the return air grille should be immediately in front of the opening in the plenum to allow for the free flow of return air.

When not installed in front of the opening, there must be adequate clearance around the unit to allow for the free flow of return air.

Nominal Tons Air Conditioning & Nominal Air Flow	Square Inch Surface Area & Nominal Size		Minimum Return Air Free Area
	Disposable Filters	Washable Filters	
Up through 2 ton 800 - 900 CFM	432 sq. in. 20" x 25"	260 sq. in. 15" x 20"	260 sq. in.
2-1/2 ton 900 - 1000 CFM	480 sq. in. 20" x 30"	288 sq. in. 14" x 25"	288 sq. in.
3 tons 1300 - 1500 CFM	576 sq. in. 14" x 25" (2)	346 sq. in. 16" x 25"	346 sq. in.
3-1/2 tons 1300 - 1500 CFM	672 sq. in. 16" x 25" (2)	404 sq. in. 20" x 25"	404 sq. in.
4 tons 1500 - 1700 CFM	768 sq. in. 20" x 25" (2)	461 sq. in. 20" x 25"	461 sq. in.
5 tons 1900 - 2100 CFM	960 sq. in. 20" x 30" (2)	576 sq. in. 24" x 25"	576 sq. in.

Table 1. Recommended Remote Filter Sizes

ELECTRICAL REQUIREMENTS

WARNING



Electrical Shock Hazard

Electrically ground electric heater.
Connect ground wire to ground terminal marked.
Use copper wire rated for supply connection.
Failure to follow these instructions can result in death or electrical shock.

WARNING

USE COPPER CONDUCTORS ONLY

- Wiring must conform to the current National Electric Code ANSI/NFPA No. 70, or Canadian Electric Code Part I, CSA Standard C22. 1, and local building codes. Refer to the following wiring diagrams. See unit nameplate for minimum circuit ampacity and maximum over-current protection size.
- Electrical wiring, disconnect means and over-current protection are to be supplied by the installer. Refer to the rating plate for maximum over-current protection, minimum circuit ampacity, as well as operating voltage. Select the proper supply circuit conductors in accordance with tables 310-16 and 310-17 in the National Electric Code, ANSI/NFPA No. 70 or tables 1 through 4 in the Canadian Electric Code Part I, CSA Standard C22.1.
- The power supply must be sized and protected according to the specifications supplied on the product.
- **This air handler is factory-configured for 240 volt, single phase, 60 cycles for 208-volt applications see “208 Volt Conversion” in the “Electrical Connections” section.**
- Separate openings have been provided for 24V low voltage and line voltage. Refer to the dimension illustration of specific location.
- For optional electric heater applications refer to the instructions provided with the accessory for proper installation.

NOTE: The unit must be grounded with separate ground connector(s). See the electrical connection diagrams beginning on Page 12 for typical field wiring connection. High voltage pigtail wiring connections are included in the unit. For systems requiring additional electric heat, this plug-in harness will be discarded and the high voltage connection will be made on field wire points on the heater kit. Low voltage control wiring are pigtail leads located outside the cabinet and are color coded to match the connection called out on the wiring schematic.

IMPORTANT

The variable speed motor in the EFV electric furnace contains DC filter capacitors that will cause a surge or inrush of current when power is applied. Power is to remain applied to the motor except during servicing. Remove AC power before plugging or unplugging the input power to the motor. Do not install blower relays that interrupt line voltage to the motor.

ELECTRICAL CONNECTIONS

- 1 - Models with electric heat: Determine the number of circuits needed to supply the heater with electrical power. See the EFV Electric Furnace Accessory Kit label for number of circuits and ratings.
- 2 - Disconnect all power supplies.
- 3 - Remove the control panel.
- 4 - Using the pre-punched wiring holes, install UL listed wires and fittings.
- 5 - Connect appropriate size wire to the pull disconnect terminals
- 6 - Connect green ground wire(s) (1 or 2) to the ground terminal(s) (1 or 2) marked
- 7 - Install conduit-opening plugs in any unused openings.
- 8 - Reinstall the control panel
- 9 - Reconnect power.
- 10 - Dispose of all remaining parts

WARNING



Electrical Shock Hazard

Disconnect all power supplies before servicing.
Replace all parts and panels before operating
Failure to do so can result in death or electrical shock.

WARNING



Run 24V Class II wiring only through specified low voltage opening. Run live voltage wiring only through specific high voltage opening. Do not combine voltage in one opening.

Changing Circuit Breaker Orientation

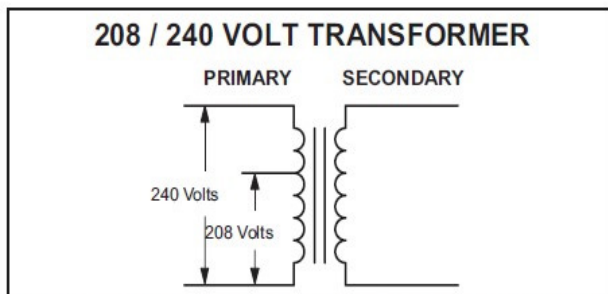
For EFV Electric Furnace with Circuit Breaker Line Voltage Connections:

Units with circuit breakers installed in the vertical position must have breaker switch position "ON" in the up position and switch position "OFF" in the down position. This is necessary to meet agency certification and National Electric Codes requirements.

However, if the EFV Electric Furnace is installed in a horizontal right-hand discharge position, the breaker will need to be installed so that the UP position of the breaker is the ON position. The circuit breaker orientation change is required by UL 1995, Article 26.18 (25 Sep 2005).

208 VOLT CONVERSION

- 1 - Disconnect all power supplies before servicing.
- 2 - Remove the access panel.
- 3 - Using the wiring diagram located on the unit access panel as a reference move the 14ga black transformer lead from the 240 volt terminal on the transformer the 240 volt terminal on the transformer to the 280 volt terminal on the transformer.



Converting Unit from 240VAC to 208VAC

⚠ WARNING



Electrically ground. Connect ground wire to ground terminal marked "GND"

Failure to do so can result in death or electrical shock.

⚠ WARNING



Electric Shock Hazard. Can cause injury or death unit must be properly grounded in accordance with national and local codes.

Line voltage is present at all components when unit is not in operation. Disconnect all remote electric power supplies before opening access panel. Unit may have multiple power supplies.

CONDENSATE DRAIN CONNECTION

For EFV units installed with a mating coil section, refer to the coil installation instructions as well as the EFV condensate drain connection installation procedures for proper condensate drainage.

Do not operate unit without a drain trap. The condensate drain is on the negative pressure side of the blower; therefore, air being pulled through the condensate line will prevent positive drainage without a proper trap.

To avoid drain pan overflow, the web must be removed from inside any threaded drain pan hole to which a drain line is to be connected. Use care when removing the web so as to not damage the coil.

On horizontal units, the primary drain connection is flush with the bottom of the inside of pan. Auxiliary connection is raised above the bottom of the inside of the pan. Plastic web covering 3/4" auxiliary connection must be broken out if used. Do not get primary and auxiliary connections interchanged.

When making drain fitting connections to the drain pan, hand tighten only. Overtightening the fittings can split connections on the drain pan.

The unit is provided with 3/4" FPT condensate drain connections.

- Connect the drain lines to the appropriate drain pan fittings.
- Secondary drain connections should be connected to a separate drainage system.
- Install a trap in the drain line below the bottom of the drain pan and pitch the drain lines down from the coil at least 1/4" per foot of run. Horizontal runs over 15' long must also have an anti-siphon air vent (stand pipe), installed ahead of the horizontal run. An extremely long horizontal run may require an oversized drain line to eliminate air trapping.

- Route to the outside or to an appropriate drain. Check local codes before connecting drain line to an existing drainage system.
- Insulate drain lines where sweating could cause water damage.
- The removal of cabinet knockouts required for drain connections can be made much easier with the indoor coil assembly removed from the cabinet.
- Install drain lines so they do not block service access to front of unit. A 24" clearance is required for filter, coil, or blower removal and service access.
- Make sure unit is level or pitched slightly toward primary drain connection so that drain pan will empty completely without water standing in pan.
- Install a 2" trap in the primary drain line as close to the unit as practical. Make sure that the top of the trap is below connection to the drain pan to allow complete drainage of pan.
- Auxiliary drain (if used) should be run to a place where it would be noticeable if it becomes operational. Occupant should be warned that a problem exists if water should begin running from the auxiliary drain line.
- Test condensate drain pan and drain line after installation is complete. Pour several quarts of water into drain pan, enough to fill drain trap and line. Check to make sure drain pan is draining completely, no leaks are found in drain line fittings, and water is draining from the termination of the primary drain line.

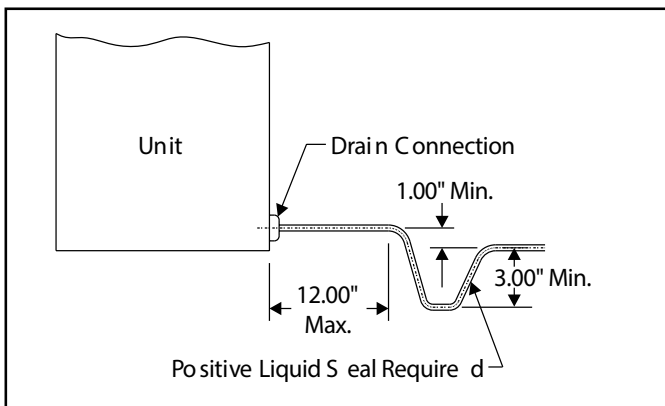


FIGURE 2. Typical Condensate Drain Connection

⚠ CAUTION

A field fabricated auxiliary drain pan, with a drain pipe to the outside of the building, is required in all installations over a finished living space or in any area that may be damaged by overflow from the main drain pan. In some localities, local codes may require an auxiliary drain pan for any horizontal installation.

COMPLETE INSTALLATION

NOTE: Refer to outdoor unit installation instructions for system start-up instructions and refrigerant charging instructions.

Check/Change Airflow

For proper system operation, the airflow through the indoor coil should be between 350 – 450 CFM per ton of cooling capacity. Each electric furnace is shipped configured to provide the correct airflow for the maximum tonnage outdoor unit. If the electric furnace is to be used with smaller tonnage outdoor equipment, the variable speed motor must be configured for that application by field changing the motor control board.

⚠ IMPORTANT

The cooling blower speed must be set to provide a minimum of 350 CFM airflow per ton (12,000 Btuh) of outdoor cooling capacity.

Variable Speed Features

The EFV electric furnace is equipped with a variable speed motor and will deliver a constant airflow within a wide range of external static pressures. The variable speed blower offers the following comfort features:

Soft Start

When called into operation, the variable speed motor will slowly ramp up to normal operating speed. This eliminates the noise and discomfort that results caused by the initial blast of air encountered with standard electric furnaces. It can take up to 7.5 minutes to reach normal operating speed.

Continuous Blower Operation

The comfort level of the living space can be enhanced when using this feature by allowing continuous circulation of air in between calls for cooling or heating. The circulation of air occurs at 50% of the normal airflow rate (350 CFM minimum).

Reduced Airflow Operation

For situations where humidity control is a problem, the variable speed motor can be enabled to operate at a 10% reduction in the normal airflow rate. This can be achieved by connecting to a standard humidity control that is normally closed and opens on humidity rise.

Variable Speed Motor

Locate the motor control board in the blower control box. Set the HEAT and COOL CFM taps by moving the board jumpers to the A, B, C, or D positions (see Figure 2) based on the information found in Table 2. Variable Speed Motor Application. The ADJUST tap on the control board can be used to raise or lower the table CFMs. The (+) tap will raise the table CFM by 10%, and the (-) tap will lower the table CFM by 12%.

NOTE: When changing the control taps, the high voltage must be off in order for the new settings to take effect.

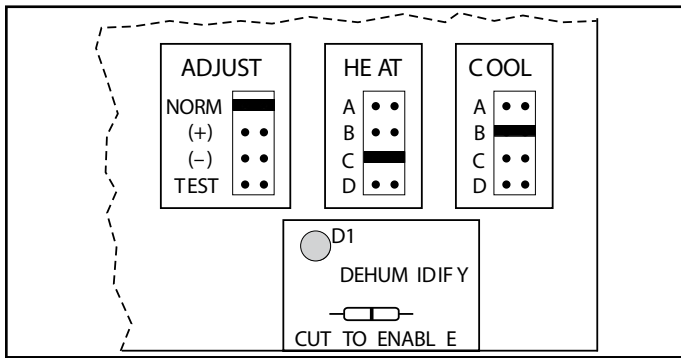


FIGURE 3. Motor Board Taps and Dehumidify Resistor

This model is designed for use with heat pumps as well as air conditioning systems. The motor control board needs to sense a signal on the “O” thermostat wire in order to use cooling delay timing. For a straight air conditioning system, connect the “O” wire to the 24 volt “R” wire.

The motor control board that provides airflow selection also features LED indicators that display operating mode, humidity control, and airflow CFM. In addition, thermostat signals for emergency heat (EM), aux. heat (W1), reversing valve (O), compressor stage 1 (Y1), compressor stage 2 (Y2), and blower (G) are all indicated by lit LED’s on this board. If a humidistat is used, the dehumidify LED will light when the humidistat opens and the motor runs at reduced airflow. The control board also has a CFM LED that displays the operating CFM. This red LED flashes once for each 100 CFM. For example: if the operating CFM is 1200, the CFM LED will flash 12 times, then pause before repeating the 12-flash pattern.

Special note for units equipped with a humidistat: If using a humidistat, the dehumidify resistor located on the bottom right of the control board must be removed (see Figure 3).

The HUM terminal on the board must be connected to the Normally Closed contact of the humidistat so that the board senses an open circuit on high humidity.

Application Table

The versatility of the variable speed motor enables the performance of the EFV electric furnace to be tailored to the different modes of operation encountered in heating and cooling. All EFV electric furnaces are capable of operational more than one nominal airflow rate. The operation of an EFV blower at different airflow rates is determined by the control board taps and the thermostat (see Table 2. Variable Speed Motor Application). Before beginning the setup, become familiar with the information found in this table.

The data in the application table is categorized by unit size and mode of operation. Use the information provided to determine the CFM taps needed for cooling and heating.

								Control Board Taps							
Model	Mode	Thermostat						Cool				Heat			
		HUM	EM	W1	O	Y2/ Y1	G	A	B	C	D	A	B	C	D
								CFM				CFM			
EFV08BCP	Cont. Blower						X	500	400	350	350				
	Cooling	**			X	X		1000	800	700	600				
	Heating					X		1000	800	700	600				
	Aux. Heat			X		X		***	***	***	***	1000	800	700*	600*
	Emer. Heat		X	X				***	***	***	***	1000	800	700*	600*
EFV12BCP	Cont. Blower						X	600	500	400	350				
	Cooling	**			X	X		1200	1000	800	600				
	Heating					X		1200	1000	800	600				
	Aux. Heat			X		X		***	***	***	***	1200	1100*	1100*	1100*
	Emer. Heat		X	X				***	***	***	***	1200	1100*	1100*	1100*
EFV16CCP	Cont. Blower						X	800	700	600	500				
	Cooling	**			X	X		1600	1400	1200	1000				
	Heating					X		1600	1400	1200	1000				
	Aux. Heat			X		X		***	***	***	***	1600	1400*	1200*	1100*
	Emer. Heat		X	X				***	***	***	***	1600	1400*	1200*	1100*
EFV20DCP	Cont. Blower						X	900	800	700	600				
	Cooling	**			X	X		1800	1600	1400	1200				
	Heating					X		1800	1600	1400	1200				
	Aux. Heat			X		X		***	***	***	***	1800	1600	1400*	1200*
	Emer. Heat		X	X				***	***	***	***	1800	1600	1400*	1200*

NOTE:

Maximum Heat kit size per model:
 EFV08 - 10KW
 EFV12 - 15KW
 EFV16 - 20KW
 EFV20 - 20KW

- * This airflow control setting is not approved for use with highest KW heater size
- ** Humidistat will reduce cooling airflow by 10% in high humidity
- ***Airflow is greater of COOL and HEAT when both electric heat and heat pump are operating
- + When equipped with a 20KW heat kit, the minimum airflow control setting is 1400 CFM, (NORM) ADJUST.

ADJUST tap (+) will increase airflow by 10%, while ADJUST tap (-) will decrease airflow by 12%
 ADJUST tap (TEST) will cause the motor to run at 70% of full airflow. Use this mode for troubleshooting only.
 At the start of a call of cooling, there is a short run of 82% of full airflow for 7.5 minutes. An "O" signal is required to enable this function.
 At the end of a call for cooling there is a blower delay of 1 minute.

Table 2. Variable Speed Motor Application

COOLING (COOLING ONLY OR HEAT PUMP)

Single Stage Cooling

For single stage cooling, Y1 and Y2 need to be jumpered.

When the thermostat calls for cooling, the circuit between R and Y and R and G completed, signaling the indoor blower motor to service the cooling demand. This also closes the contactor in the outdoor unit starting the compressor and outdoor fan motor. In heat pumps, circuit R and O energizes the reversing valve, switching the valve to the cooling position. (The reversing valve remains energized as long as the selector switch is in the COOL position)

At the completion of the cooling demand, the indoor blower and outdoor unit should cycle off. The indoor blower motor will cycle off approximately 60 seconds after the outdoor unit shuts off.

Two Stage Cooling

On a call for 1st stage cooling, the thermostat closes R to Y. In 1st stage cooling, the blower runs at 70% of the selected cooling airflow. On a call for 2nd stage cooling, the thermostat closes R to Y2. In 2nd stage cooling, the blower runs at 100% of the selected cooling airflow.

Heating (electric heat only)

When the thermostat calls for heat, the circuit between R and W is completed, and the heater sequencer is energized. A time delay follows before the heating elements and the indoor blower motor comes on. Units with a second heat sequencer can be connected with the first sequencer to

W on the thermostat sub base or connected to a second stage on the sub base. The blower turns off 30 seconds after the thermostat stops calling for heating.

Heating (heat pump with electric heat)

When the thermostat calls for heat, the circuits between R and Y and R and G are completed. Circuit R-Y energizes the contactor starting the outdoor fan motor and the compressor, signaling the indoor blower motor to service the cooling demand. Circuit R and O or R and B energizes the reversing valve, switching it to the heating position (depends on outdoor unit). If the room temperature should continue to fall, the circuit between R and W1 is completed by the second stage heat room thermostat. Circuit R-W1 energizes a heat sequencer. The completed circuit will energize supplemental electric heat (if applicable). Units with a second heater sequencer can be connected with the first sequencer to W1 on the thermostat or connected to a second heating stage W2 on the thermostat sub base. The blower turns off 60 seconds after the thermostat stops calling for heating.

Emergency Heat (heat pump with electric heat)

If selector switch on thermostat is set to the emergency heat position, the heat pump will be locked out of the heating circuit, and all heating will be electric heat (if applicable). A jumper should be placed between W2 and E on the thermostat subbase so that the electric heat control will transfer to the first stage heat on the thermostat. This will allow the indoor blower to cycle on and off with the electric heat when the fan switch is in the AUTO position.

MAINTENANCE

IMPORTANT

Do not operate system without a filter. A filter is required to protect the coil, blower, and internal parts from excessive dirt and dust.

- Inspect air filters at least once a month and replace or clean as required. Dirty filters are the most common cause of inadequate heating or cooling performance.
- Replace disposable filters. Cleanable filters can be cleaned by soaking in mild detergent and rinsing with cold water.
- Install new/clean filters with the arrows on the side pointing in the direction of air flow. Do not replace a cleanable (high velocity) filter with a disposable (low velocity) filter unless return air system is properly sized for it.
- If water should start coming from the secondary drain line, a problem exists which should be investigated and corrected. Contact a qualified service technician.

REPAIRING OR REPLACING CABINET INSULATION

IMPORTANT

DAMAGED INSULATION MUST BE REPAIRED OR REPLACED before the unit is put back into operation. Insulation loses its insulating value when wet, damaged, separated or torn.

Matte- or foil-faced insulation is installed in indoor equipment to provide a barrier between outside air conditions (surrounding ambient temperature and humidity) and the varying conditions inside the unit. If the insulation barrier is damaged (wet, ripped, torn or separated from the cabinet walls), the surrounding ambient air will affect the inside surface temperature of the cabinet.

The temperature/humidity difference between the inside and outside of the cabinet can cause condensation on the inside or outside of the cabinet which leads to sheet metal corrosion and, subsequently, component failure.

REPAIRING DAMAGED INSULATION

Areas of condensation on the cabinet surface are an indication that the insulation is in need of repair.

If the insulation in need of repair is otherwise in good condition, the insulation should be cut in an X pattern, peeled open, glued with an appropriate all-purpose glue and placed back against the cabinet surface, being careful to not overly compress the insulation so the insulation can retain its original thickness. If such repair is not possible, replace the insulation. If using foil-faced insulation, any cut, tear, or separations in the insulation surface must be taped with a similar foil-faced tape.

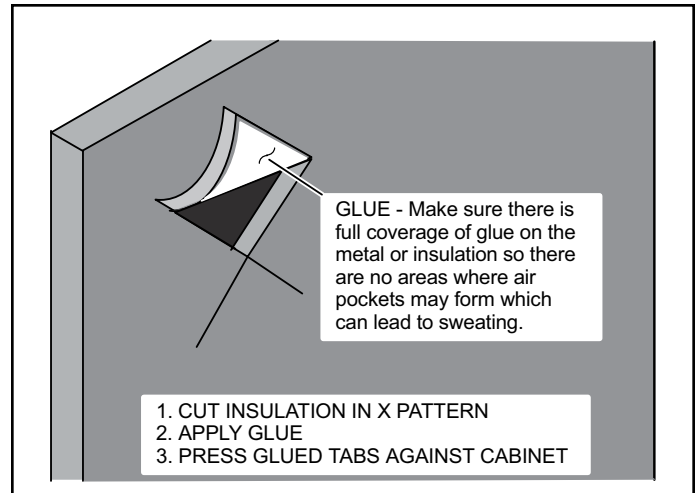


FIGURE 4. Repairing Insulation

PROFESSIONAL MAINTENANCE

At the beginning of each heating season, the unit should be serviced by a qualified installer or servicing agency.

Owner Record		
Furnace Model # _____	Serial # _____	Installation Date: _____
Installed By:		
Dealer: _____		
Address: _____		
Telephone # _____	License # _____	
Contact Person: _____		
Other Equipment Installed:		
Equipment Type: _____		
Model # _____	Serial # _____	Installation Date: _____
Equipment Type: _____		
Model # _____	Serial # _____	Installation Date: _____
Equipment Type: _____		
Model # _____	Serial # _____	Installation Date: _____