



INSTALLATION GUIDE & OPERATION MANUAL ASPEN MANUFACTURED HOME PRODUCT

AEN SERIES – MANUFACTURING HOME ELECTRIC FURNACE



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1. IMPORTANT SAFETY INSTRUCTION

Potential safety hazards are alerted using the following symbols. The symbol is used in conjunction with terms that indicate the intensity of the hazard. It is the responsibility of the owner and the installer to read and comply with the safety information and the instructions accompanying these symbols.



Read the precautions in this manual carefully before operating the unit.



Read the instructions in this manual carefully before operating the unit.



Read the instructions in this manual carefully before servicing the unit.



Read the instructions in this manual carefully before wiring the unit.



Warning or Caution

▲ WARNING

This symbol indicates a potentially hazardous situation, which if not avoided, could result in serious injury, property damage, product damage or death.

▲ CAUTION

This symbol indicates a potentially hazardous situation, which if not avoided, may result in moderate injury or property damage.

▲ WARNING

Certified technicians or those individuals meeting the requirements specified by NATE may use this information. Property and product damage or personal injury hazard may occur without such background.

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 must be supervised to ensure that they do not play with the appliance.

Product designed and manufactured to permit installation in accordance with local and national building codes. It is the installer's responsibility to ensure that the product is installed in strict compliance with the aforementioned codes. Manufacturer assumes no responsibility for damage (personal, product or property) caused due to installations violating regulations.

▲ WARNING

Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury, or death.

▲ WARNING

This unit is not approved for outdoor installations.

▲ WARNING

HAZARDOUS VOLTAGE!

Failure to follow this warning could result in property damage, severe personal injury, or death.

Disconnect ALL electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized

▲ WARNING

The unit is designed for operation with 208/240 V, single phase, 60 Hz power supply. Aspen will not be responsible for damages caused due to modification of the unit to operate with alternative power sources.

WARNING

When this unit is installed in an enclosed area, such as a garage or utility room with any Carbon Monoxide producing devices (i.e. automobile, space heater, water heater etc.) ensure that the enclosed area is properly ventilated.

▲ WARNING

This product designed and manufactured to permit installation in accordance with local and national building codes. It is the installer's responsibility to ensure that product is installed in strict compliance with national and local codes. Manufacturer takes no responsibility for damage (personal, product or property) caused due to installations violating regulations. Installation of this unit shall be made in accordance with the National Electric Code, NFPA No. 90A and 90B, and any other local codes or utilities requirements.

▲ WARNING

Do not bypass safety devices.

▲ CAUTION

Only factory authorized kits and accessories should be used when installing or modifying this unit unless it is so noted in these instructions. Some localities may require a licensed installer/service personnel.

▲ WARNING

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

▲ CAUTION

Only factory authorized kits and accessories should be used when installing or modifying this unit unless it is so noted in these instructions. Some localities may require a licensed installer/service personnel.

▲ WARNING

This product can expose you to chemicals including lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.65Warnings.ca.gov

- This appliance shall be installed in accordance with national wiring regulations.
- The of the space necessary for correct installation of the appliance including the minimum permissible distance to adjacent structures is specified in Section 4 of this manual under "INSTALLATION INSTRUCTIONS AND CLEARANCES".
- For air handlers with supplementary heaters, the minimum clearance from the appliance to combustible surfaces is specified in Section 4 of this manual under "INSTALLATION INSTRUCTIONS AND CLEARANCES", the equipment was tested for 0" clearance.
- A wiring diagram with clear indication of the connections to external control devices and supply cord can be found in Section 11 of this manual.
- The range of external static pressure at which the appliance was tested (add-on heat pumps and ducted appliances with supplementary heaters only) available in Section 7 of this manual.
- The method of connecting the appliance to the electrical supply and interconnection of separate components is detailed in Section 6, LOW VOLTAGE CONNECTIONS and in Section 11, WIRING DIAGRAMS.
- None of the components in this product family are designed or approved to be suitable for outdoor use.
- Refer to Section 9 of this manual for details of Electric Heat Kits that may be used in conjunction with the appliance, field installed heater kit fitting/installation instructions are supplied with the heater kits.

This Air Handler unit is a PARTIAL UNIT AIR CONDITIONER, complying with PARTIAL UNIT requirements of Standard UL 60335-2-40/CSA 22.2 NO. 60335-2-40, and must only be connected to other units that have been confirmed as complying to corresponding PARTIAL UNIT requirements of this Standard.

This appliance is not intended for use at altitudes exceeding 2,000 meters.

2. INTRODUCTION & GENERAL INFORMATION

These air handlers are versatile multi-positional unit with the following standard features:

- **Application Versatility:** One model that delivers 2 to 5 tons of cooling or heating airflow. Upflow (with MAD coil box) and downflow applications. Can be installed in closet and alcove.
- **Motor:** Constant torque ECM speeds and torques are controlled by software embedded in the motor to maintain constant torque. Motors are pre-programmed at the factory. Direct drive blowers circulate air quietly and efficiently. Motor speeds and torques programmed in the motor. Blowers mounted on rails so they can be easily removed for service.
- **Cabinet:** Sturdy, galvanized steel cabinet with painted front panels. Cabinet fully insulated with 1/2" micro mat non-hygroscopic insulation to prevent sweating, to encapsulate glass fibers, and to provide excellent R-value. Stick pins ensure insulation remains in place.
- **Modular Electric Heat Kits:** Heat kits available with either circuit breakers or terminal blocks. Available from 3 to 20 KW. Models with electric heat include sequencers and temperature limit switches for safe, efficient operation. Modules are easily installed in the field using molex plugs or can be ordered factory-installed. Controls are accessible

from the front for easy service. Disconnect does not protrude through the wall panel.

- **Blower:** Direct drive multi-speed blowers circulate air quietly and efficiently. ECM motors in the AEN allow for precise air volume selection. Motor speeds can be easily selected via motor terminals. Blowers mounted on rails so they can be easily removed for service.
- **Electronic Circuit Board:** Electronic circuit board provides 30 sec. ON/OFF blower time delay extracting more heat/cool from the coil
- **Warranty:** Five-year limited parts warranty.

3. INSPECTION

On receiving the product, visually inspect it for any major shipping related damages. Shipping damages are the carrier's responsibility. Inspect the product labels to verify the model number and options are in accordance with your order. Manufacturer will not accept damage claims for incorrectly shipped product.

4. INSTALLATION INSTRUCTIONS AND CLEARANCES

This unit is designed for zero clearance installation on three sides and adequate clearance to provide access for service in the front. A minimum of 18" (alcove) or 6" (closet) clearance is recommended on the front end (Fig 4A-1).

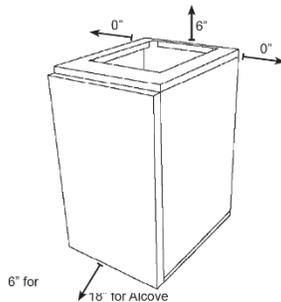


Fig 4.1. Minimum Clearance for Air Handler

For closet installation, the return air opening can be on the front door, above the furnace casing on a wall, or on the electric door's louvered door (if applicable.) A minimum clearance of six inches is required, on the return side, in order to allow for proper airflow.

4.1. Closet and Alcove Installation

These units are designed to be installed in a closet or an alcove.

If installing the electric furnace into a closet or an alcove, the unit must leave front clearance to service the unit. The bottom of the unit should also rest on a sturdy platform or floor.

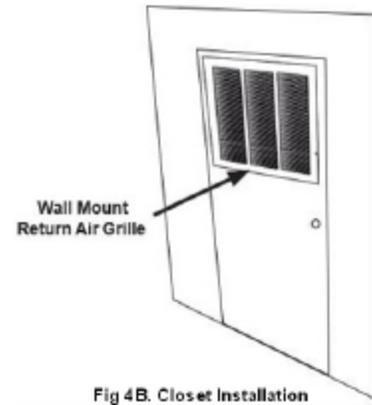


Fig 4B. Closet Installation

Fig. 4.1.1. Closet Install

Airflow must be made available to the electric furnace's return. Not doing so may cause improper heating as well as premature heating element failure.

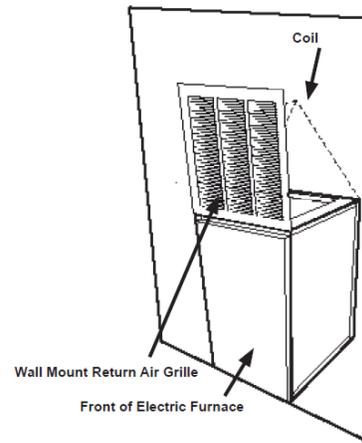


Fig. 4.1.2. Alcove Install

4.2. Ductwork and Duct Connector

Duct systems should be installed in accordance with standards for air-conditioning systems, National Fire Protection Association Pamphlet No. 90A or 90B. They should be sized in accordance with National Environmental System Contractors Association Manual K, or whichever is applicable. It is recommended that installers refer to the "Manufactured Housing Duct System Guide to Best Practices" by MHI-MHRA.

On any job, non-flammable flexible collars should be used for the return air and discharge connections to prevent transmission of vibration (Fig 4.3). Although these units have been specially designed for quiet vibration-free operation, air ducts can act as soundboards, can, if poorly installed, amplify the slightest vibration to the annoyance level.

All main supply and return air drops should be properly sized as determined by the designer of the duct system and should not necessarily be the size of the duct flange openings of the unit. (The duct size should never be smaller than the flange openings of the air handler supply and return air openings.)

To install the duct connector:

1. Attach duct connector foam gasket along the perimeter of the duct opening to seal the duct connector to the top of the duct.
2. To connect the duct connector, insert it into the floor opening and bend back the tabs inside the duct. Fold the tabs over 90 degrees to ensure a secure connection. Seal around the duct connector.
3. Slit the corners of the duct connector that stick up above the floor and then bend the sides over onto the floor surface.
4. Insulate between the floor base and the floor when used on a combustible floor. Be sure to cut the insulation around the perimeter of the duct connector opening.
5. Install the floor base over the floor opening with the flanges on the 11 x 13 inch opening facing down.
6. Use four screws to secure the floor base to the floor.

It is recommended that wherever supply and return air sheet metal ducts pass through unconditioned areas, they be insulated to prevent excessive heat loss during heating operation. When applied in conjunction with summer air conditioning, sheet metal duct routed through unconditioned areas should be insulated and have an outside vapor barrier to prevent formation of condensation.

5. ELECTRICAL LINE VOLTAGE WIRING

▲ WARNING

Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury, or death.

▲ WARNING

Before obtaining access to terminals, all supply circuits must be disconnected.

▲ WARNING

A fused disconnect switch must be field provided for the unit to be in compliance with UL 60335-2-40 Clause 7.12.2.

These units are designed for single phase 208/240 volts, 60 HZ power supply. Wire selection and wiring must be in accordance with the latest edition of the National Electric Code, or in Canada the Canadian electrical Code, and local codes to determine correct wire sizing. Unit terminals are designed to accommodate copper and aluminum wiring. If aluminum wiring is used: All applicable local and national codes must be followed please observe special precautions relative to sizing, wire connections and corrosion protection.

All models with 3, 5, 8, 10kW electric heaters are arranged for single circuit connections. Models larger than 10 kW are arranged for multi-circuit protection. Not intended for simultaneous operation of electric heat and reverse cycle heating. Refer to the top part of wiring diagram at the end of this guide for detailed information. Refer to section 9 for Electric Heat Kit applications.

Line voltage wiring should be routed through the access holes at the top of the air handler. To minimize air leakage, seal the wiring entry point on the outside of the unit. Proper electrical conduit connection fittings should be used. Connect the power wiring to the line side connections on the air handler. The electrical ground wire should be connected to the grounding lug. Ensure both the field supplied ground wire and air handler GREEN ground wire are both secured to the grounding lug of the air handler.

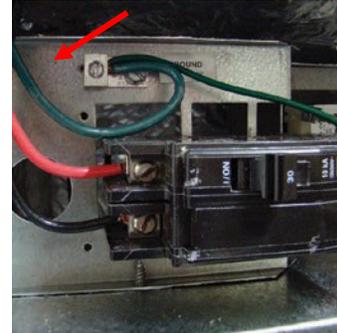


Fig 5.1

6. LOW VOLTAGE CONNECTIONS

A 24 V power supply is provided by an internally wired low voltage transformer that is standard on all models. If the line voltage being supplied to the air handler is 208-volt single phase, the line voltage tap on the low voltage transformer needs to be moved from the 240-volt tap to the 208-volt tap (See Fig 6.0). If this is not done, the secondary output voltage of the transformer will be too low. See the Wiring Diagram, Section 11.



Fig 6.0

Connect the field wiring at the pigtails supplied with the air handler as specified in Wiring diagram, Fig. 11.1, 11.2 & 11.3. For air leakage, seal the wiring entry point at the outside of the unit.

▲ NOTICE

All wiring must comply with local and national electrical code requirements. Read and heed all unit caution labels.

6.1. Single Stage Cooling with Electric Heat

The electric furnace comes factory setup for a single stage cooling system. If factory installed accessory electric heaters are pre-installed, the unit will also have a low voltage wire for the electric heat (Fig 6.1)

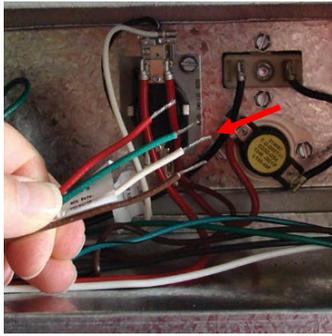


Fig 6.1

During cooling mode operation, the indoor blower G wire will energize a time delay relay inside the electric furnace. After a short time delay period, the time delay relay contacts will close and apply power to the blower motor. Fan delay periods are 7 seconds ON delay and 65 seconds OFF delay. (See Wiring Diagram Section 11).

The Y wire from the thermostat is not connected at the electric furnace. This wire goes directly to the outdoor unit 24 volt wiring to turn on the outdoor condensing unit when a call for cooling takes place. The 24 volt common for the outdoor unit circuits is connected at the electric furnace Brown wire.

The electric heater low voltage wiring W terminal is wired directly from the thermostat to the electric furnace. The blower will delay a heat call ON for a period of 5 seconds. The OFF delay period is 60 seconds.

6.2. Two Stage Condensing Units

If the outdoor condensing unit is a two-stage model, a field provided Y2 wire can be connected to the motor using an electrical spade connector. The number 4 and 5 terminals on the motor are speed taps that will increase the blower speed for second stage cooling operation. Both the G and Y2 terminals will be energized at the same time during a call for second stage blower speed operation. The motor will run at the speed where the Y2 wire is connected (Fig 10.2).



Fig 6.2

Operating CFM based upon each speed tap number is shown on the electrical wiring diagram of the unit. Final air volume adjustments should be made by referencing total external static pressure (Table 7.1, below).

7. AIR VOLUME ADJUSTMENT

Air volume needs to be set to the level recommended by the outdoor unit equipment manufacturer. Most systems will require around 400 CFM of indoor air for every 1 ton of system cooling capacity. The air volume must be set prior to attempting system charge.

This electric furnace uses a 240V X-13 motor. The air volume level produced by the electric furnaces at varying external static pressure levels is shown in Table 7.1.

MODEL	SPEED TAP	CFM V. EXTERNAL STATIC								
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
AEN	TAP 5	1850	1800	1760	1700	1650	1530	1400		
	TAP 4	1500	1430	1375	1315	1260	1210	1155	1100	1040
	TAP 3	1375	1305	1255	1180	1130	1070	1030	980	920
	TAP 2	1155	1070	1015	950	885	830	795	730	660
	TAP 1	930	860	805	750	685	605	560	520	480

Table 7.1

Use a Magnehelic Gauge with a 1" scale and two static pressure tips to measure the static pressure during the air volume adjustment procedure. The high port static pressure tip should be placed in the supply duct near the outlet of the air handler. The low port static pressure tip should be placed in the return air duct near the entrance to the air handler. The factory provided air filter should be in place inside of the air handler.

- 7.1.1. Select a starting speed tap from the CFM table. The blower motor has selectable speed taps labeled 1 through 5. The speed taps are energized by 24 volts received from the time delay relay. When two stage cooling units are used, both the first and second stage fan speed taps will be energized at the same time. The motor will run at the speed generated at the highest motor speed tap.
- 7.1.2. Call for fan only operation at the thermostat.
- 7.1.3. Read the external static pressure level on the Magnehelic gauge.
- 7.1.4. Make speed tap selection changes to get the air volume as close as possible to the required level.
- 7.1.5. If the static pressure is above 0.5" w.c., excessive turbulence or duct friction needs to be reduced. (Obstructions in the duct system can also cause excessive static pressure.
- 7.1.6. When proper air volume is established, move on to the charging procedure.

NOTE:

- Airflow data indicated is at 240V, front return, dry coil conditions only; tested without filters, and without electric heat installed.
- Electric Furnace units are tested to UL60335-2-40 standards up to 0.6 in. w.c. external static pressure.
- The above chart are for information only. For optimal performance, external static pressures of 0.2 in. w.c. to 0.5

in. w.c. are recommended. Heating applications are tested at 0.5 in. w.c. external static pressure. For satisfactory operation, external static pressure must not exceed value shown.

- Airflow data shown is from testing performed at 240 Volts. The AEN unit is equipped with a standard ECM constant torque motor.
- The above data can be used for airflow at other distribution voltages.

8. SYSTEM CHARGING

▲ CAUTION

An improperly charged system may cause degradation in system performance and damage the compressor. After installation of the coil, refer to the outdoor unit manufacturer for changing techniques and amount of charge. If outdoor unit manufacturers charging instructions are unavailable; then refer to instructions below to charge the system.

1. Bring airflow up to the maximum CFM possible according to Table.
2. Evacuate refrigeration system to micron level required by outdoor unit manufacturer.
3. Release system charge from outdoor unit and call for cooling.
4. Use outdoor unit equipment manufacturer specific charging charts if available and make proper charge adjustment based upon outdoor unit instructions.
5. If outdoor unit instructions and charts are not available, use Aspen provided charts. Make certain indoor air temperature is near comfort level setpoint 75F, prior to establishing superheat and subcooling levels.

9. ELECTRIC HEAT

This air handler is available with factory installed or field installed 3kW to 20kW electric heater kits. Refer to this product's Specification Sheet for electric heater kit electrical data. For field installed electric heater kits, refer to the installation manual provided with the electric heat kit for the correct installation procedure. If installing this option, the ONLY heat kits that are permitted to be used are in Table 9.1. Refer to the unit's Serial and Rating plate or this product's specification sheets to determine the heat kits compatible with each air handler in this product family. No other accessory heat kit besides stated in Table 9.1 may be installed in these air handlers. Not intended for simultaneous operation of electric heat and reverse cycle heating.

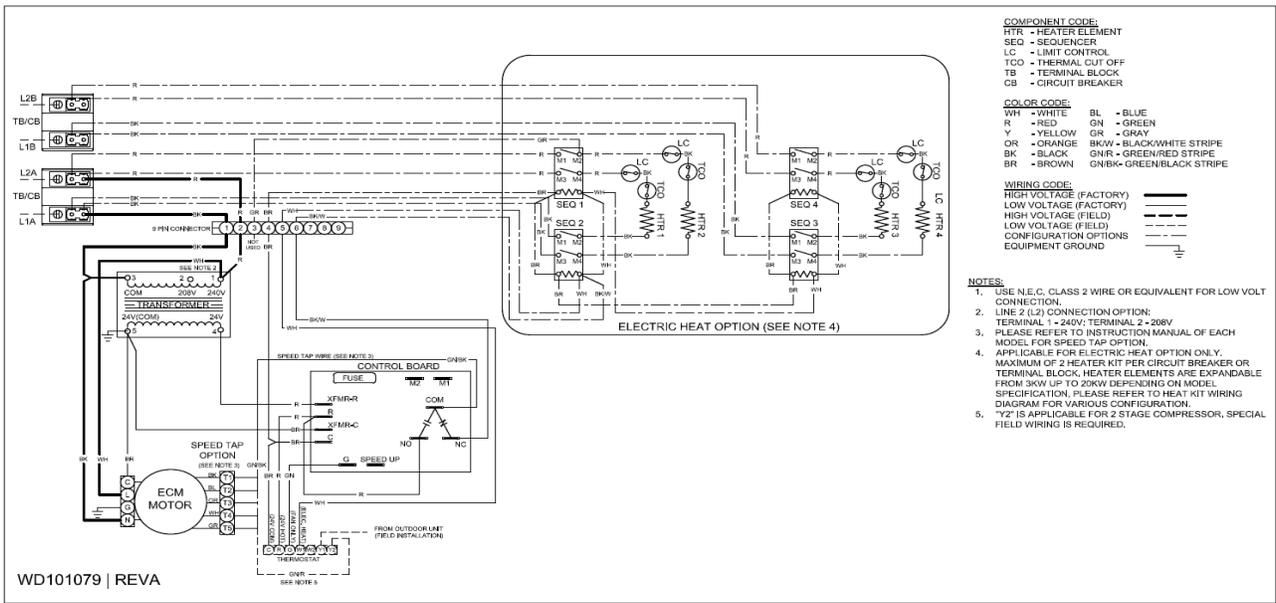
MODEL	HEAT KIT	SPEED TAP	MINIMUM CFM REQUIRED FOR EHK
AEN	F(C,T)L03	T1	805
	F(C,T)L05	T1	805
	F(C,T)L08	T4	1255
	F(C,T)L10	T4	1255
	F(C,T)L15	T4	1255
	F(C,T)L20	T4	1255

TABLE 9.1 AEN Electric Heat Kits

10. FINAL SYSTEM CHECKOUT

- 10.1 Make certain all cabinet openings are properly sealed, and any grommets moved during installation are moved into proper place.
- 10.2 With cooling system operating, check for condensate leakage.
- 10.3 Perform leak detection inspection of refrigerant circuit and connecting piping.
- 10.4 Secure all cabinet doors. All panels must be in place and secured. For airtight application, all gaskets must remain intact on all surfaces as shipped with the unit at prescribed locations to achieve 2% low leakage.

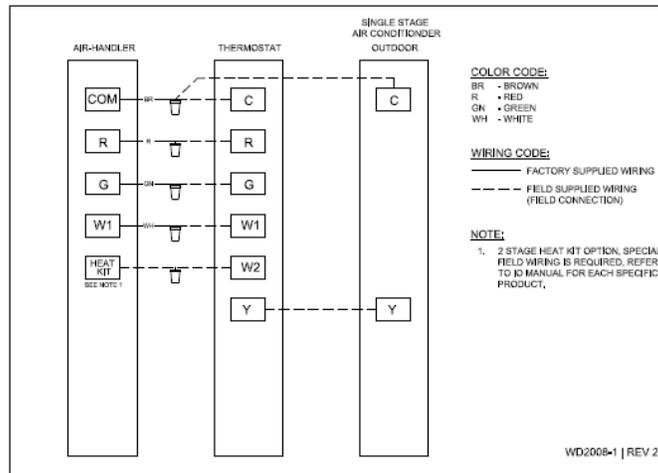
11. WIRING DIAGRAMS



ECM Motor

NOTE: Wiring Diagram is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

Fig. 11.1

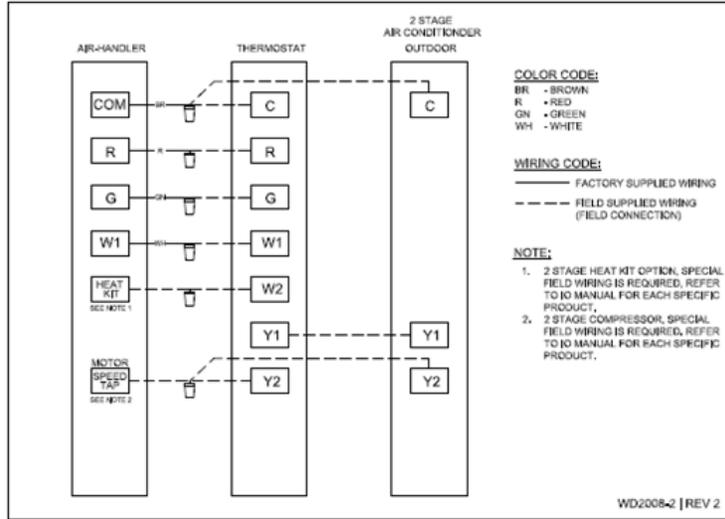


Single-Stage AC System Wiring

NOTE: Wiring Diagram is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

Fig. 11.2

WIRING DIAGRAMS



Two-Stage AC System Wiring

NOTE: Wiring Diagram is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

Fig. 11.3



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Subject to change without notice and without incurring obligation.