INSTALLATION INSTRUCTIONS

FOSSIL FUEL KIT AXWR02FFA1

FOR USE WITH

Heat Pump Outdoor Sections

These instructions must be read and understood completely before attempting installation.

SYSTEM MATCH INFORMATION

The Fossil Fuel Kit may only be used with Manufacturers Series, heat pump outdoor sections and the listed coil matches at the rated or above airflow.

NOTE: Check the furnace airflow capabilities to be sure it can supply adequate airflow for the system. See checks and adjustments Page 3.

Coil matches and airflow are listed in the Split System Summary. Coil static drops versus CFM is listed in the coil manual.

OPERATION

The purpose of the fossil fuel kit is to perform the following switching functions so that the heat pump and furnace will not run simultaneously unless the unit is in defrost mode.

The indoor thermostat calls for heat through the “Y” circuit and calls for the furnace through the “W” circuit. The furnace acts as auxiliary heat and emergency heat.

When a call for heat is made, the thermostat will send a “Y” signal and call for “Heat Pump” operation. If the heat pump is not able to maintain the desired indoor temperature, the heat pump will shut off and the furnace will come on from the second stage of the thermostat. The thermostat operates with an algorithm that will determine when the 2nd stage of heat will be activated.Because the thermostat algorithm is designed to control the setpoint within plus or minus 3° F, no pronounced “controlled” temperature differences should be experienced.

When the Heat Pump goes into defrost mode, the heat pump defrost board sends a ”W” signal to the furnace which causes it to run, so there is not cold air coming from the vents. As soon as the defrost cycle is complete the furnace is shut off and the heat pump continues to supply heat.

If the indoor thermostat is switch over to call for emergency/ auxiliary heat, it sends a ”W” signal to the furnace and a built in relay internally disconnects the ”Y” signal to the heat pump, which shuts it down.
NOTE: Jumper from W1 to E must be installed for emergency heat to function.

Components

Thermostat: Performs the same functions as a normal thermostat. In addition, it acts as a selection control, which does not allow the compressor and furnace to run simultaneously unless the heat pump is in defrost mode.

Duct temperature Sensor: Protects the compressor from damage due to high pressure during heating and defrost. Switch will open if temperature gets above 117° F and will close again once temperature falls below 92° F.

Relay: Removes the duct temperature sensor from the circuit while unit is in cooling mode.

MOUNTING CONTROLS AND ELECTRICAL WIRING

⚠ WARNING

Electrical shock hazard.

Turn OFF electric power at fuse box or service panel before making any electrical connections.

Failure to do so can result in property damage, personal injury and/or death.

⚠ WARNING

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation MUST conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code, NFPA NO. 54 / ANSI Z223.1, current edition, or with the National Standards CAN/CGA B149.1; CAN/CGA B149.2; and CSA C.22.1- Canadian Electrical Code Part 1, depending on jurisdiction.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

Failure to carefully read and follow all instructions in this manual can result in malfunctions, property damage, personal injury and/or death.

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LOW VOLTAGE WIRING

All low volt wiring should be 18 ga minimum thermostat wire. **These instructions and the Wiring Diagram will reference wire colors. If the wiring used does not match colors make notes about colors used.** Make sure enough wire is left to properly route and make connections at termination points.

CAUTION

Incorrect connections could result in damage to a control board, thermostat or transformer.

NOTE: Place included bushing into low volt hole in furnace casing before routing wires. If additional space is needed, drill a second ½″ hole and install second bushing before routing wires.

WIRE REQUIREMENTS

Thermostat to Furnace: This system provides a thermostat which requires 6 wires from it to the furnace control box.

a. Locate the existing thermostat (if installed) and determine number of wires from it to the furnace. Normally there will be 2 or 3 wires.

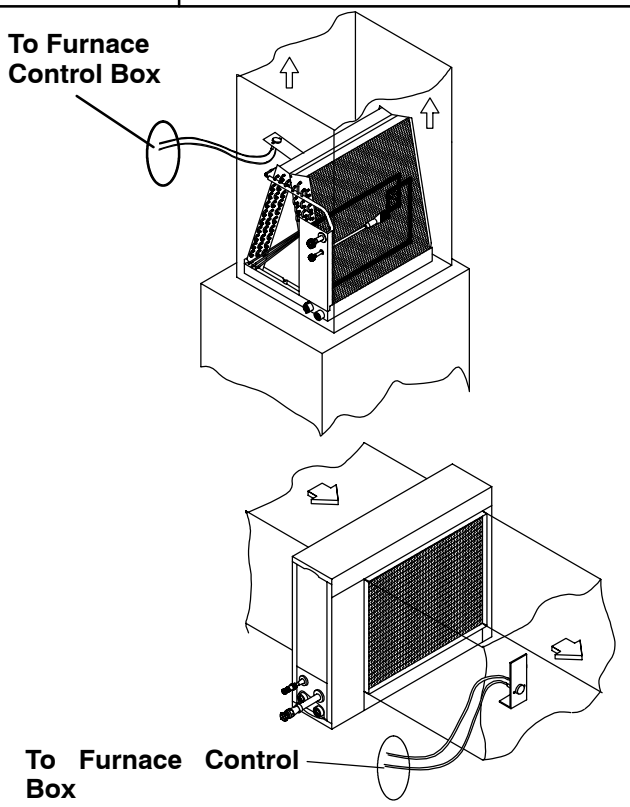
b. Additional wires may be added or the old wires can be used to pull new wire through.

Heat Pump to Furnace: This requires a total of 5 wires routed from the heat pump control box to the furnace control box. All thermostat connections to the heat pump will be made in the furnace control box area.

MOUNT DUCT SENSOR

Mount the bracket for duct sensor on “A” coil as shown in **Figure 1**. This location will also work for counter flow applications. For horizontal coils locate the bracket approximately 6″ downstream of the coil.

Figure 1 | **Mount Duct Sensor**



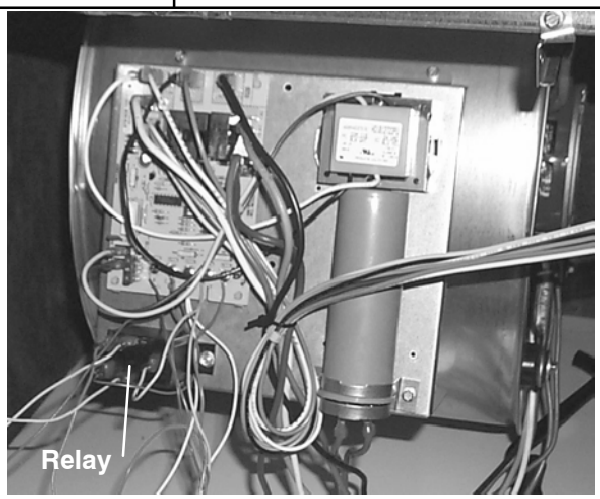
Using the 2 included screws, mount the sensor as illustrated. Limit should face away from the air stream.

Drill a $^{7}/_{8}$″ hole in the duct and install the bushing supplied. Connect the provided 8′ long yellow wires, to the sensor spade terminals and route wires through the bushing to the furnace control box.

MOUNT RELAY

Mount relay in the furnace control box just below the control board as shown in **Figure 2**. Use the self-tapping screws included in the kit.

Figure 2 | **Mount Relay**



Using the included wires:

a. Attach the connector side of one of the short yellow wires to terminal 4 on the relay.

b. Attach the terminal side of the second yellow wire to terminal 2 of the relay.

c. Attach the terminal of the blue wire to spade 3 of the relay.

d. Attach the terminal of the orange wire to spade 1 of the relay.

e. Attach one of the yellow wires from the Duct Temp Sensor to spade 5 of the relay.

OUTDOOR HEAT PUMP SECTION

Route 5–wire thermostat cable from outdoor section to furnace control box.

a. Complete connections at the outdoor unit, inside junction box, Red to R, Blue to C, Orange to O, White to W, and Yellow to Y. Reference as shown on wiring diagram.

THERMOSTAT

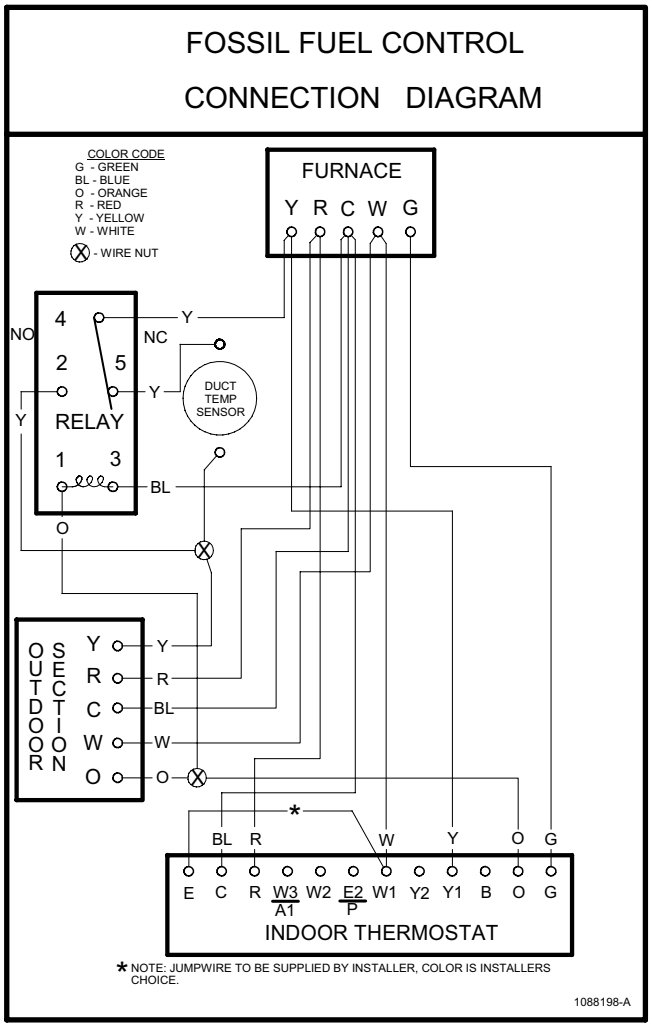
SEE INSTRUCTIONS PROVIDED WITH THERMOSTAT FOR MOUNTING AND PROGRAMING INSTRUCTIONS.

FINAL WIRING CONNECTIONS

Reference wiring diagram and Figure 6 for reference with the following connections. All connections are made in the furnace control area.

1. Connect the Yellow wire from the Duct Temp Sensor to the Yellow wire from terminal 2 of the relay and Yellow wire from outdoor section. Use supplied wire nut.
2. Connect the Orange wire from terminal 1 of the relay and Orange wire from outdoor section to Orange wire from furnace. Use supplied wire nut.
3. Connect Yellow wire from relay spade #4 and Yellow wire from Indoor Thermostat to “Y” terminal on Furnace Control Board.
4. Connect Red wire from outdoor section and Red wire from Indoor Thermostat to “R” terminal on Furnace Control Board.
5. Connect Blue wire from relay spade #3, Blue wire from Indoor Thermostat, and Blue wire from outdoor section to “C” terminal on Furnace Control Board.
6. Connect White wire from outdoor section and White wire from Indoor Thermostat to “W” terminal on Furnace Control Board.
7. Connect Green wire from Indoor Thermostat to “G” terminal on Furnace Control Board.

NOTE: Once wiring is completed, use the wire ties provided as strain relief for the low volt wires routed inside the furnace control box.



CHECKS AND ADJUSTMENTS

Refer to installation instructions for the furnace, heat pump coil and outdoor heat pump section for checks and adjustments and perform in conjunction with the following.

⚠ WARNING

DANGER OF BODILY INJURY OR DEATH

FAILURE TO PERFORM PROPER CHECKS AND ADJUSTMENTS COULD RESULT IN IMPROPER EQUIPMENT OPERATION OR FAILURE AND RESULT IN FIRE OR CARBON MONOXIDE POISONING OR DEATH

AIRFLOW – ACROSS COIL

1. Refer to the coil instructions for static pressure drop across coil for the CFM of air required and check according to instructions.
2. If the airflow is inadequate change the furnace blower motor to a higher speed tap.
3. If the airflow is too high change to a lower speed tap.

NOTE Speed tap may be the one shown on furnace wiring diagram as the heating speed tap. Some furnaces have a blower relay and may show separate speed taps for heating and cooling but separate speeds cannot be used with this system. **The furnace blower will run on the same speed for all functions.**

AIRFLOW – FURNACE TEMPERATURE RISE

1. Following the furnace manufacturer's instructions measure the temperature rise across the heat exchanger.
2. Compare with the temperature rise specifications given on the furnace rating plate. A temperature rise within the range given on the rating plate is satisfactory.
3. If temperature rise is too high adjust blower drive or change to a higher speed tap, even if it was changed because of too much air flow across the coil, Reference Step 3, Airflow Across Coil.

HEATING CHECKOUT

1. Turn on all power except 230 volt line to outdoor section.
2. Press thermostat "Mode" button to select "OFF".
3. **INSTALLERS NOTE** (**MUST BE FOLLOWED)**

   The following configuration options must be selected in order for the thermostat to function properly as a fossil fuel kit in ICP equipment.

   There are two menus available with the thermostat, a user menu and an installer menu. The instructions provided with the thermostat show how to enter and navigate these menus.

   Installer Menu Options

   Item 1 HEAT PUMP COMPRESSOR CONFIGURATION – LEAVE AS DEFAULT (1 Compressor on Y1)

   Item 2 ELECTRIC HEAT FAN CONFIGURATION – SET TO OFF (the furnace does not require a G signal for blower operation)

   Item 9 PUMP (FOSSIL FUEL KIT ALTERNATIVE) – SET TO OFF

   Item 10 COMPRESSOR LOCKOUT – LEAVE AS DEFAULT (OFF)

   Item 13–15 OPTIONAL REMOTE TEMPERATURE SENSE – LEAVE AS DEFAULT (OFF)

   Item 16 STAT SEN L – LEAVE AS DEFAULT (ON)

   User Menu Options

   Item 6 HEAT FAST – SET TO ON

   Item 8 OUTDOOR TEMPERATURE SENSE – LEAVE AS DEFAULT (OFF)

   Item 9 ACTIVE RUN PRG BY TELEPHONE – LEAVE AS DEFAULT (OFF)

   All other options are at homeowner and installers discretion.

   SPECIAL NOTES

   a. Installer must jumper the E terminal to the W1 terminal in order for the emergency heat function to operate.

   b. If voltage from power grid is less than 104V, you may experience problems in operation. If this happens, you will need to install a 75VA class II transformer, ICP kit number AXWR020TA1.

4. The thermostat can be programmed at this time or after checkout. Refer to programming instructions provided with thermostat in this booklet.
5. Press fan button on thermostat, "fan ON" should appear. Blower should run. Press fan button again, "fan AUTO" should appear. Blower should turn off.
6. Set thermostat set point to below room temperature. Press the mode button until HEAT appears on the screen. Adjust setpoint to 2° above room temperature. Blower should run and a "click" should be heard in the outdoor section (contactor closing).
7. Press the mode button on the thermostat until OFF appears on the screen. Adjust the setpoint to just below room temperature. Turn on the 230V power to the outdoor unit. Nothing apparent will be happening, but the crankcase heater (if option installed) is now being energized. If the outdoor temperature is below 75 ^{0}F and a crankcase heater is installed, allow the unit to stay in this mode at least 6 hours. This is needed to vaporize any refrigerant that may be in the compressor oil.
8. Press mode on the thermostat until HEAT appears on the screen. Adjust the setpoint to 2° above room temperature. Count to 30 sec. Turn the electric power off at the outdoor unit disconnect switch. Check that there is no clattering or unusual noise. The outdoor fan blade should have started turning and a humming noise should have been heard from the compressor. The indoor fan should continue to run.

COOLING CHECKOUT

Perform checkout according to instructions in outdoor section manual.

SYSTEM OPERATION

The indoor thermostat operates like any standard heat/cool or cool only thermostat in the cooling mode. When switched over to "Heat" the thermostat has two stages. The first stage will control the heat pump. The second stage will only control the furnace and it will come on if the heat pump cannot maintain the desired indoor temperature.

NOTE: If the thermostat algorithm determines that the heat pump can not meet the heating demands, 2nd stage heat, furnace, will be called for. In this case, the heat pump will be deactivated and the furnace will be activated by the control. Please be aware there is no set temperature difference or time at which the furnace will be called for, this is determined by the thermostat algorithm based on rate of

temperature change and the deviation of the room temperature from the setpoint.

TROUBLE SHOOTING

The following Operation Sequence and chart will aid in diagnosing the problem area, but they do not cover the furnace or heat pump specifics.

⚠ WARNING

The following information is intended for use by a qualified service technician who is familiar with the safety procedures required in installation checks and repair and who is equipped with the proper tools and testing instruments.

Many of the checks must be done while either the furnace or heat pump is running and there is both line voltage (115V) and low voltage (24V) circuit in the control box. Checks or repairs not done properly may result!t in in jury from electrical shock which can be serious or even fatal.

If you install or perform checks or service on equipment, you must assume responsibility for any bodily injury or property damage which may result to you or others. We will not be responsible for any injury or property damage arising from improper installation, service, and/or service procedures.

Operation Sequence

NOTES:

1. "R" always has low volt if power is applied to thermostat
2. Word signal means normal 24V reading using voltmeter

Cooling

- Thermostat sends furnace Y and G signal
- Thermostat sends relay coil O signal which energizes coil.
- Thermostat sends condenser Y and O signal, relay bypasses limit switch in cooling.

Cooling (Temperature Limit Trips)

- Thermostat sends furnace Y and G signal
- Thermostat sends relay coil O signal which energizes coil.
- Thermostat sends condenser Y and O signal, relay bypasses limit switch in cooling.

Heating

- Thermostat sends furnace Y and G signal
- Thermostat sends condenser Y signal

Heating (Temperature Limit Trips)

- Thermostat sends furnace Y and G signal
- Y signal from thermostat is prevented from going to condenser because limit opens circuit

Heating (1st and 2nd Stage Heat)

- Thermostat sends furnace W, Y and G signal
- Thermostat sends condenser Y and W signal

Heating (1st and 2nd Stage/Auxiliary, Temperature Limit Trips)

- Thermostat sends furnace W, Y and G signal
- Thermostat sends condenser W signal; Y signal from thermostat is prevented from going to condenser because limit opens circuit.

Heating (2nd Stage/Auxiliary Heat)

- Thermostat sends furnace W signal
- Thermostat sends condenser W signal

Heating (2nd Stage/Auxiliary, Temperature Limit Trips)

- Thermostat sends furnace W signal
- Thermostat sends condenser W signal

Defrost

- Thermostat sends furnace Y and G signal
- Thermostat sends condenser Y signal
- Condenser sends furnace W signal
- Reversing valve shifted by defrost board, no O signal from thermostat

Defrost (Temperature Limit Trips)

- Thermostat sends furnace Y and G signal
- Y signal from thermostat is prevented from going to condenser because limit opens circuit

Emergency/Auxiliary Heat

- Thermostat sends furnace W signal
- Thermostat sends condenser W signal

Emergency/Auxiliary Heat (Temperature Limit Trips)

- Thermostat sends furnace W signal
- Thermostat sends condenser W signal

Conditions	Outdoor Unit (Check Cond. Fan)	Furnace Operating (C and W on Furnace)	Furnace Operating (C and W on Furnace)	Furnace				Condenser			
				W	R	Y	G	W	R	Y	O
Cooling	on	on	off		X	X	X		X	X	X
Temperature Limit Trips	on	on	off		X	X	X		X	X	X
Heating - Algorithm calls for HP	on	on	off		X	X	X		X	X	
Temperature Limit Trips	off	on	off		X	X	X		X		
Heating - Algorithm calls for both HP and Furnace*	on	on	on	X	X	X	X	X	X	X	
Temperature Limit Trips	off	on	on	X	X	X	X	X	X		
Heating - Algorithm calls for Furnace (2nd Stage Heat)	off	on	on	X	X			X	X		
Temperature Limit Trips	off	on	on	X	X			X	X		
Defrost	on (no fan)	on	on	X	X	X	X	X	X	X	
Temperature Limit Trips	off	on	off		X	X	X		X		
Emergency Heat	off	on	on	X	X			X	X		
Temperature Limit Trips	off	on	on	X	X			X	X		

* During heating, if the heat pump can not meet the setpoint, both the heat pump and furnace will run together. The thermostat will shut the heat pump off after 30–60 seconds.