CONGRATULATIONS!

DEAR HOMEOWNER: *Please retain this manual for future reference, for you own today the machine of TOMORROW !*

Installation & Operating Instructions for High Efficiency Heat Pump Outdoor Unit

RHP SERIES

LR 102 110

NRTC/C

EPA POLLUTION PREVENTER

Manufactured By

GOETTL AIR CONDITIONING, INC.

P.O. BOX 52029, PHOENIX, ARIZONA 85072-2029

INSTALLATION AND OPERATING INSTRUCTION MANUAL
HEAT PUMP RHP MODELS 2-5 TONS

I. INTRODUCTION

Please take a few minutes to read these instructions before you install and/or use your heat pump. This will help you obtain the full value from your unit. It will also help you avoid any needless service costs that may result from installing, or operating the unit incorrectly.

PRECAUTIONS FOR INSTALLATION AND SAFE OPERATION

1. Read these instructions carefully. Failure to follow these instructions could cause a malfunction of the heat pump unit resulting in injury, death and/or property damage.
2. Check your local codes and utility standards. The installation must comply with these codes.
3. Shut off electrical power before making connections on the unit or removing panels for servicing. (There may be more than one disconnect.)
4. Refer to page 8 for maintenance procedures.
5. Do not operate this unit at outdoor temperatures below 60 degrees F on cooling nor above 75 degrees on heating.
6. The components of the cabinet may have sharp edges or protrusions which can cut you. The tubing and compressor contain high pressure refrigerant. They must not be exposed to high temperature or be punctured, as serious injury may result.

The importance of a proper installation cannot be overemphasized. The best designed unit may operate poorly if installed improperly. Unlike portable appliances where the quality of operation can usually be determined as it leaves the factory, the performance of an heat pump depends, to a large extent, on its installation.

Problems are likely to occur if the installer does not follow the procedures outlined.

Wire Size - Inadequate wire sizes can cause an excessive voltage drop (and high current) resulting in damage to the compressor and fan motors.

Duct Sizes - Inadequate duct size, elbows, distributors or registers can restrict air flow.

Duct Openings - Improperly sealed duct sections can cause considerable loss in cooling capacity due to air leakages, resulting in high operating costs.

Duct Insulation - Inadequate duct insulation in attic space will cause heat gain or loss in the system.

Refrigerant Charge - Improper charge or introduction of air, moisture or foreign matter can seriously affect the system performance and reliability and is the primary cause of premature compressor failure.

II. DIMENSIONS

Heat pumps have proven their reliability over several decades. Years of research, engineering and only the highest quality component parts and workmanship have gone into the Goettl units to make them the most reliable in the industry. Before a model is released for production, it undergoes comprehensive testing in environmental test rooms with temperatures ranging from sub-freezing 0° F to 120° F desert temperatures.

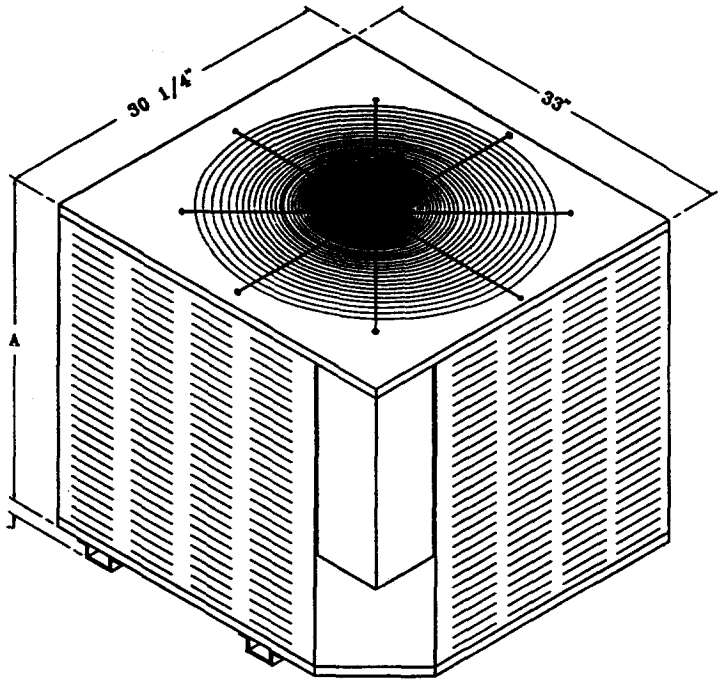

FIGURE 1

TABLE 1

MODEL NO.	PART NO.	A
RHP241H	103132	30
RHP301H	103133	30
RHP361H	103134	30
RHP421H	103137	30
RHP481H	103140	34
RHP601H	103143	34

III. POWER SUPPLY & WIRING

Page 11 shows a typical wiring diagram. However, each unit will have its own appropriate wiring diagram attached to the access panel of the wiring control section on the unit. **ALL WIRING AND FUSING MUST COMPLY WITH LOCAL AND NATIONAL ELECTRICAL CODE REQUIREMENTS.**

The 24 volt control circuit connections are made at the left side of the panel (see fig. 1). The main power connections are made at the "L" terminals of contactor; through a knockout at the bottom of the control panel. These connections must be tight and electrically secure. An appropriate fused disconnect must be weather tight, and must be installed at the unit location. The fuse(s) should be dual element type. Fuse and ampacity ratings are listed in the table on page 3 and also on the rating plate of the unit.

CAUTION: The unit must always be grounded with a suitable ground connection. (Refer to local codes).

TABLE 2

ELECTRICAL DATA AT 230V

			241H	301H	361H	421H	481H	601H
Compressor	Locked Rotor Amps	1 Ph	62.5	76.0	90.5	107.0	129	169.0
		3 Ph	----	----	----	----	----	----
	Rated Load Amps	1 Ph	11.6	13.5	18.0	19.9	23.7	28.9
		3 Ph	----	----	----	----	----	----
Outdoor Motor	Full Load Amps	1 Ph	0.8	1.0	1.7	1.7	1.9	1.9
		3 Ph	----	----	----	----	----	----
Unit Total	Full Load Amps	1 Ph	12.4	14.5	19.7	21.6	25.6	30.8
		3 Ph	----	----	----	----	----	----
Max. Fuse Size, Amps		1 Ph	25	30	40	45	55	60
		3 Ph	----	----	----	----	----	----
Min. Circuit Ampacity		1 Ph	15.3	17.9	24.2	26.6	31.6	38.1
		3 Ph	----	----	----	----	----	----

Based on UL operating conditions
Unit operates at 208/230V

Data applies to 230V
460V units available on special order
Specifications subject to change without notice

MATCHING INDOOR SECTION

AIR HANDLER/COIL NO.	GAH241H1/H	GAH301H1/H	GAH361H1/H	GAH421H1/H	GAH481H1/H	GAH601H1/H

IV. INSTALLATION

Typical Central Air Conditioning System With RHP Remote Heat Pump and GAH AirHandler

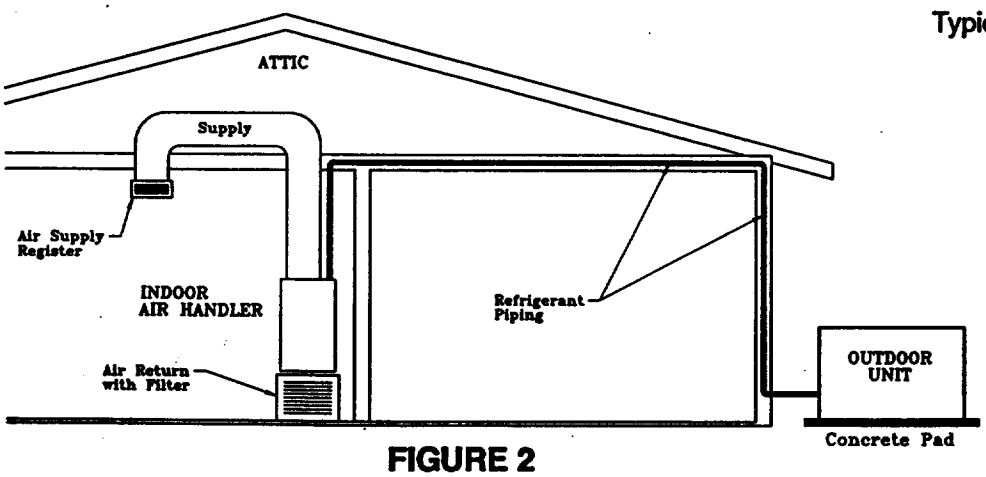

FIGURE 2

SPLIT SYSTEM INSTALLATION

The outdoor section of the system is factory wired and ready to locate and be connected, through refrigerant piping, to an indoor unit. The indoor unit may be a vertical or horizontal air handler, with or without supplemental resistance heaters.

It is very important to correctly size the outdoor and indoor units to the application to assure satisfactory operation. Contact your local distributor with specification questions.

LOCAL CODES AND REQUIREMENTS GOVERNING INSTALLATION AND WIRING MUST BE FOLLOWED.

Take special note of grounding requirements for your locale.

LOCATION OF OUTDOOR UNIT

The outdoor section should be in a location which will:

1. Not restrict the air flow to or from the outdoor coil.
2. Minimize the collection of dirt, leaves, and debris.
3. Be shaded if at all possible.
4. Provide the shortest distance for refrigerant piping.
5. Offer convenient electrical service.
6. Be no closer than 18 inches from a solid wall.
7. Have a solid base, such as a concrete slab, not connected to the building foundation.

V. REFRIGERANT SIZE AND LINE SIZE

See table 3 for recommended refrigerant line sizes and refrigerant charges based on the following specifications:

1. R-22 at 50 degree evaporating and 100 degree liquid temperatures.
2. Liquid lines not to exceed 3 PSI pressure drop.
3. Suction lines not to exceed 3 PSI pressure drop at 1500 ft./min. minimum velocity.
4. For vertical rises, the suction line sizes as recommended for the standard 25 ft. run are to be used. (Oil traps will not be required if this is adhered to. For risers over 20 ft., consult factory for guidance).
5. Any oil used must be approved by the applicable compressor manufacturer — Suniso 3G-S or Texaco WF-32 (Capella B) or Sontex 200 LT (Scrolls)

Note: Line sizes 40 ft. and greater may require a hard start kit.

The actual amount of total refrigerant charge for each installation may have to be adjusted to ensure that unit performance characteristics (compressor electrical current draw and suction and discharge pressures) are consistent with those given in the applications tables for the applicable ambient conditions. (Refer to product catalog for compressor data).

TABLE 3

REFRIGERANT LINE SIZES, REFRIGERANT (R-22) & OIL CHARGE SERIES RHP/GAH (HI/H SERIES)

	LINE LENGTH (FT)	25 (STD)	30	40	50	60	70	80	90	100
241	SUCT/LIQ	3/4 - 3/8	3/4 - 3/8	3/4 - 3/8	3/4 - 3/8	3/4 - 1/2	3/4 - 1/2	3/4 - 1/2	3/4 - 1/2	3/4 - 1/2
	CHR-ADD (OZ)	H (77)	+3	+10	+17	+42	+54	+66	+78	+91
	OIL-ADD (OZ)	----	----	+2	+5	+8	+10	+12	+14	+16
301	SUCT/LIQ	3/4 - 3/8	3/4 - 3/8	3/4 - 3/8	3/4 - 1/2	3/4 - 1/2	3/4 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2
	CHR-ADD (OZ)	H (91)	+3	+10	+30	+42	+54	+68	+80	+93
	OIL-ADD (OZ)	----	----	+3	+5	+8	+10	+13	+16	+18
361	SUCT/LIQ	7/8 - 3/8	7/8 - 3/8	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2
	CHR-ADD (OZ)	H (123)	+3	+18	+30	+43	+56	+68	+80	+93
	OIL-ADD (OZ)	----	----	+3	+5	+8	+11	+13	+16	+18
421	SUCT/LIQ	7/8 - 3/8	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	1 1/8 - 1/2
	CHR-ADD (OZ)	H (126)	+6	+18	+31	+43	+56	+68	+80	+98
	OIL/ADD (OZ)	----	----	+3	+6	+8	+11	+13	+16	+21
481	SUCT/LIQ	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	7/8 - 1/2	1 1/8 - 1/2	1 1/8 - 5/8	1 1/8 - 5/8	1 1/8 - 5/8
	CHR-ADD (OZ)	H (182)	+6	+19	+31	+43	+59	+110	+130	+150
	OIL-ADD (OZ)	----	----	+4	+6	+8	+13	+17	+20	+23
601	SUCT/LIQ	1 1/8 - 1/2	1 1/8 - 1/2	1 1/8 - 1/2	1 1/8 - 1/2	1 1/8 - 1/2	1 1/8 - 5/8	1 1/8 - 5/8	1 1/8 - 5/8	1 1/8 - 5/8
	CHR-ADD (OZ)	H (182)	+6	+19	+31	+46	+90	+110	+130	+150
	OIL-ADD (OZ)	----	----	+4	+6	+10	+14	+17	+20	+23

Specifications subject to change without notice.

VI. START UP/CHECK OUT PROCEDURES

PRELIMINARY START UP

1. If power to the unit has been disconnected for more than 24 hours, restore power twelve (12) hours prior to start up procedure.

COOLING CYCLE CHECK OUT

1. With the thermostat calling for cooling and set 10 degrees below room temperature, engage disconnect switch(es) to start system.
2. Check the voltage at the compressor motor connections. If the voltage is 10% above or below the rated voltage or there is a difference greater than 3% between phases, shut down the system and call the power company. A failure to do so may cause damage to the equipment.
3. After the unit is in operation, it will take about 30 minutes running time to stabilize the system.
4. In order to check for a properly working system, it is recommended that a thermometer be placed both in the return air and in the air supply. After all insulating of ductwork and adjustments of air registers are complete, a temperature difference of 15 to 20 degrees is satisfactory.
5. When the above steps are completed, a check of voltage and amperage draw should be made of all motors. The readings should be within 10% of the performance ratings given for the specific ambients. Refer to the performance tables included with the catalog.
6. Suction and discharge pressures should also be checked to ensure that they are consistent with the pressures shown in the catalog for the prevailing ambient conditions. Also, a suction superheat temperature of 15 degrees F plus or minus 5 degrees F is common for these units when the outdoor ambient is approximately 95 degrees F. This could be used as a gauge in verifying that the system is not overcharged or that it has not lost some of its charge.
7. Finally, the thermostat should be checked out to assure proper operation. Literature packed with the thermostat will provide information for this check.

HEATING CYCLE CHECK OUT

1. With the thermostat calling for heat and set 10 degrees above room temperature, engage disconnect switch(es) to start system.
2. Check the voltage at the compressor motor connections. If the voltage is 10% above or below the rated voltage or there is a difference greater than 3% between phases, shut down the system and call the power company. A failure to do so may cause damage to the equipment.
3. After the unit is in operation, it will take about 30 minutes running time to stabilize the system.
4. In order to check for a properly working system, it is recommended that a thermometer be placed both in the return air and in the air supply. After all insulating of ductwork and adjustments of air registers are complete, a temperature difference of 22 to 28 degrees is considered satisfactory.
5. When the above steps are completed, a check of voltage and amperage draw should be made of all motors. The readings should be within 10% of the performance ratings given for the specific ambients. Refer to the performance tables included with the catalog.
6. Suction and discharge pressures should also be checked to ensure that they agree reasonably well with the pressures shown in the catalog for the prevailing ambient conditions. Also, a suction superheat temperature of 5 degrees F is common for these units when the outdoor ambient is approximately 47 degrees F. This should be used as a gauge in determining that the system has not lost its charge.
7. Finally, the thermostat should be checked out to assure proper operation. Literature packed with the thermostat and subbase will provide information for this check out.

VII. ELECTRICAL OPERATION

COOLING CYCLE

With the disconnect in the "ON" position, voltage is supplied to the primary of the control transformer and crankcase heater (where applicable). The control transformer reduces the voltage from either 230 or 208 to 24 volts for the low voltage and the thermostat circuits. With a single stage cool/single stage heat thermostat set in the cooling position, current is supplied from one side of the 24 volt secondary of the control transformer to the "R" terminal of the thermostat. The other side of this transformer connects to the main contactor coil through the high pressure control. When the thermostat calls for "COOLING," current from the "R" terminal is switched on to the "Y" terminal causing the compressor contactor to be energized. The main contactor closes the contacts in the high voltage circuit. The completion of this circuit will start both the outdoor fan motor and the compressor simultaneously.

The indoor fan relay which is internally wired from "G" to "Y" in the thermostat subbase is also energized and starts the indoor fan motor. The system will operate normally and begin to cool.

HEATING CYCLE

With the thermostat set in the heating mode, the "B" terminal energizes the reversing valve relay. With a call for heat the compressor contactor is energized "W" to "Y" through the jumper wire in the control panel. The indoor and outdoor fan motors are started in the same manner as in the cooling cycle. The reversing valve is always energized whenever the system switch on the thermostat is in the heat position. This eliminates the "swish" at the end of the heating cycle. Only in the de-ice cycle will the "swish" occur.

VIII. RESISTANCE HEATERS

Resistance heaters are available as an optional field installed accessory. Heaters are recommended for areas where winters are severe, because as the outdoor temperature falls, the amount of heat available in the air decreases, making it more difficult to capture. This fact of nature causes the heat pump capacity to fall at a time when the heating requirement rises. Resistance heaters can compensate for this difference in capacity. Heat pumps with resistance heaters require a single stage cool/two stage heat thermostat. With the two stage thermostat, the resistance heaters are energized if the thermostat is turned more than two degrees higher than the indoor temperature, or the indoor temperature falls more than two degrees below the thermostat setting. The heaters will also be energized during the defrost cycle.

IX. COMPONENTS WITH SPECIAL FEATURES

SCROLL COMPRESSOR:

Units equipped with scroll compressors do not have crankcase heaters and do not require hard start kits. However, they do have a 3 minute anti-short cycle timer and an accumulator (where necessary) for added compressor protection.

CAUTION:

Never use the scroll compressor to pump itself down (create a vacuum) by closing off the suction line. The high vacuum caused by the unit pumping down could cause severe internal fusite arcing resulting in a compressor failure.

Damage resulting from internal fusite arcing due to extremely low pressure is apparent when an "in-warranty" compressor is disassembled and will result in denial of warranty claims by the compressor manufacturer.

ANTI-SHORT CYCLE TIMER:

The anti-short cycle timer is to be used for compressor protection. They are described as follows:

FUNCTION - No delay on initial start up; but a momentary power failure will initiate a 3 minute delay before the compressor contactor can be re-energized.

ELECTRONIC DEFROST CONTROL:

This solid state defrost control operates in conjunction with an external sensor located at a "cold" spot on the outdoor coil. The control operates on a "Time/Temp" to initiate and "Temp" to terminate the cycle. The control will initiate a defrost cycle every 60 minutes (set by the factory) if the coil temperature at the sensor is approximately 28 degrees F or less. As the coil is being defrosted, its temperature will rise until it reaches approximately 65 degrees F. At this point the sensor will terminate the defrost cycle. The entire process will take between one to three minutes. In areas where the air is generally moisture laden and frost is prevalent, the defrost interval time may be set at 30 minutes by simply moving the jumper wire (see figure 3) from the T2 pin to T1.

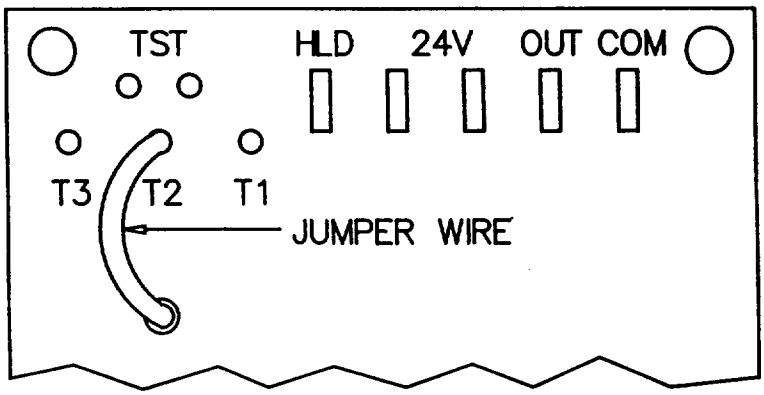

FIGURE 3

X. OPERATION AND MAINTENANCE

1. Be sure the filter is clean. Inspect every 30 days for operation; if obstructed, clean or replace filter at once. **DO NOT RUN WITHOUT A FILTER.**
2. Always let the thermostat control the operation of the system. Never try to "second guess" the thermostat, or tamper with it. Just set the thermostat at the comfort level desired AND LEAVE IT ALONE. If it gets too chilly, just turn the thermostat up a degree at a time until the desired level is achieved. Don't turn the thermostat back and forth, as this will cause the equipment to cycle off.
3. Heat pumps cannot warm up a house as fast as a furnace heats it. They pull the temperature up slowly; therefore, do not turn the unit on and immediately expect a warm environment. It may take as long as a day or so to pull up a cold, moist building when the unit is first installed; especially after it has been "soaked" in 30-40 degree ambient for days.
4. Keep both the evaporator and condenser coil surfaces clean. Accumulation of dirt will restrict the air flow and reduce the performance of your unit (and increase your utility costs).
5. Keep condensate drain line clear and clean. All blower fan motors are factory lubricated and require no additional lubrication. The **COMPRESSOR** is hermetically sealed, and **HAS NO SERVICEABLE COMPONENTS.**
6. Your new heat pump is mounted outdoors. It is good practice to treat it just as you would your automobile if it was exposed to the elements constantly; an occasional coat of wax will give added protection against the elements.
7. Your new heat pump compressor is equipped with a Permanent Split Capacitor Motor. There-

fore, ALWAYS WAIT AT LEAST THREE MINUTES AFTER SHUTTING UNIT OFF BEFORE TRYING TO RESTART IT. If the unit is started before the refrigerant pressures have a chance to balance, the compressor motor may overload; and in very rare cases, blow a fuse (or trip a circuit breaker). Under normal operations, this will not happen. This is most likely to occur if a thermostat is chattering, or if the unit is started too quickly. Do not be alarmed if this happens. Just let the pressure balance out and then restart the unit.

8. It is a good practice when there is a power outage (especially during severe thunderstorms), to switch off your unit at the thermostat until the electrical power has been permanently restored. This could prolong the life of your compressor.

IMPORTANT - READ CAREFULLY

(This item does not apply to units equipped with scroll-type compressors).

9. Your new heat pump may contain a special compressor warming circuit to keep the compressor warm during long off periods. Do not be alarmed if this creates a slight "hum" may or not be detectable, but is normal.

   When the power has been disconnected from the unit for longer than twelve hours, be sure to turn the power back on twelve hours before starting the unit. This will give the compressor warming circuit a chance to operate and protect the compressor from damage.

HOW TO GET THE MAXIMUM PLEASURE FROM YOUR HEAT PUMP

In order that you may fully appreciate your heat pump, an outline of the basic principles involved are shown in the following paragraphs.

HEATING LOAD

The air temperature rise from a heat pump on the heating cycle is not as great as that from a fuel-fired-furnace. The supply air coming into the room may be only 12 to 26 degrees warmer than the room air. Therefore "hot or cold" spots are not evident in heat pump installations as they are in fuel-fired heating systems.

Family living habits that aid the heating system, add load to the cooling system. The heater, furnace, or boiler delivers heat into the rooms and the heat that is created within the house from electric lights, cooking, the TV set, etc. help to heat rooms; therefore less heat is required from the boiler, furnace, or unit heater.

The cooling equipment removes heat and humidity. Any additional heat released into the rooms from these other sources will make the room air warmer and place an additional load upon the equipment.

In the case of cooking, for example, four top burners of a gas range can produce more heat than a three ton air conditioner can remove. It is much more practical and economical to ventilate this concentrated heat and moisture load than it is to dispose of it through your air conditioner. As a general rule:

Whenever you plan to have your oven or range top burners on for more than a few minutes during hot weather, close off the kitchen from the rest of the house, open a window or outside door, and turn on your kitchen ventilator.

You can also effectively reduce the load on your cooling system by keeping window shades, blinds, or drapes closed or by installing awnings or canopies during hot weather.

Some days when the temperature is relatively high, it is comfortable because the air is dry. This is because the relative humidity is low. Other days when the temperature is about the same, it may be uncomfortable due to high relative humidity.

Indoor air should be both cool and relatively dry for comfort. Therefore, the cooling unit has been designed to remove both heat and moisture.

THERMOSTAT SETTING

For cooling, a temperature of 75 to 78 degrees is preferred by most people. You may select a lower temperature setting if you wish and you will probably have that temperature a good portion of the time. However, energy use increases rapidly at the very low settings, and the equipment may have difficulty maintaining the precise temperature.

Do not be concerned if in the evening, when the outside temperature drops below the inside temperature, your air conditioning system is still running. The entire structure of your house has been soaking up heat from the sun all day long. After the sun has set there is still a tremendous amount of heat in the walls, ceiling, roof, furnishings, etc., that must be disposed of before the air conditioner stops running. Outdoor temperatures can drop rapidly after sundown, while the house and its furnishings continue to give off heat for several hours.

Indoor Blower and Outdoor Fan Operation: To improve the efficiency of the unit, the blower is operated on a time delay. Depending on the outside ambient temperature, the blower may delay starting up for 5 to 15 seconds even though the thermostat calls for cooling or heating, and when the thermostat is satisfied, the blower may keep on running for 30 to 90 seconds longer. Do not be alarmed if you do not hear the blower running immediately after the unit switches on. When your unit is being automatically defrosted, the outdoor fan will stop while the unit is still running. Do not be concerned; this is a normal operation. The fan will automatically restart after the unit has completed its defrost cycle.

Your unit is a Heat Pump. It is producing heated air on the heating cycle and cooled air on the cooling cycle. The cooling or heating is accomplished by means of remote controls, is completely automatic, and requires no attention after setting the thermostat to the comfort level you desire.

The heat pump is one of the most energy efficient devices for home comfort and has proven to be extremely durable and dependable through many years of use.

Your unit operates automatically by means of remote controls, and requires no attention after setting the thermostat to the comfort level you desire.

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