

INSTALLATION & OPERATING INSTRUCTIONS

**HAVE YOU DISCUSSED WITH YOUR
INSTALLING CONTRACTOR THE
OPTIONAL \$300.00 2ND THROUGH
5TH YEAR COMPRESSOR LABOR
ALLOWANCE PROGRAM?**

For The United States and Canada only



CONVERTIBLE SELF CONTAINED PACKAGED HEAT PUMP PHB SERIES



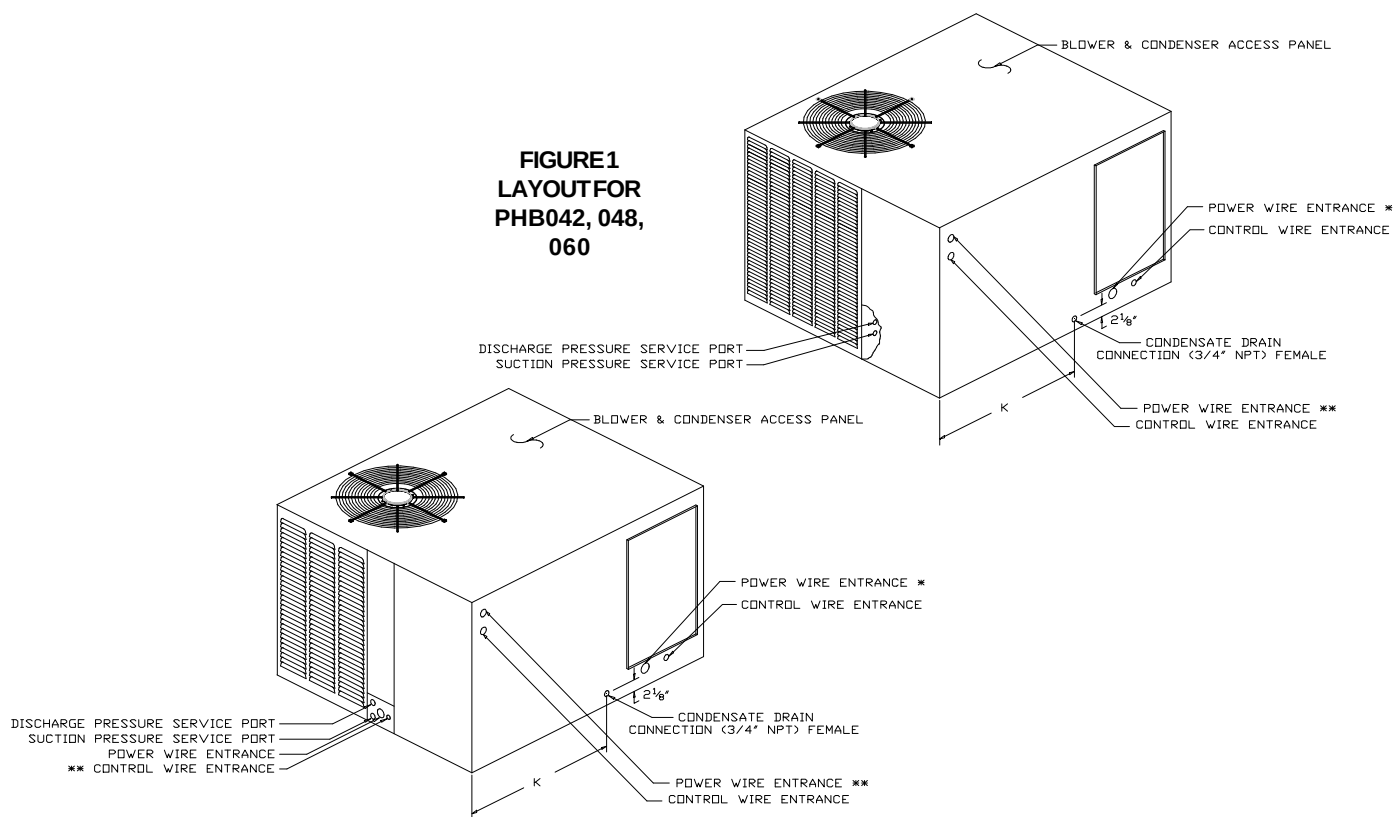
CERTIFIED
FOR CANADA

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IMPORTANT

The United States Environmental Protection Agency (EPA) has issued various regulations regarding the introduction and disposal of refrigerants in this unit. Failure to follow these regulations may harm the environment and can lead to the imposition of substantial fines. Because these regulations may vary due to the passage of new laws we suggest that any work on this unit be done by a certified technician. Should you have any questions please contact the local office of the EPA.



* Single Point Wiring Entrance for unit and optional heat kit
 ** Use this entrance for unit only, no heat kit installed.
 See Section IV, Wiring, for your choice of wiring entrance locations.

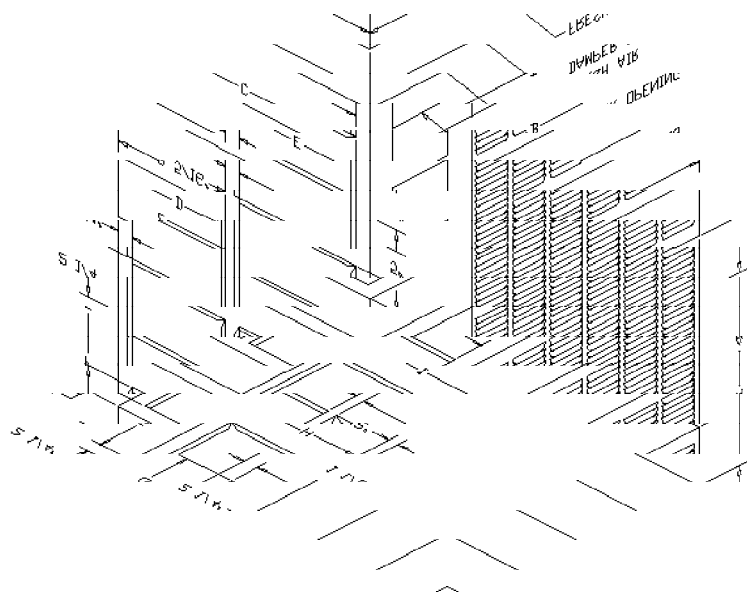


FIGURE3

TABLE 1

	CHASSIS #1	CHASSIS #2	CHASSIS #3
DIMENSIONS (INCHES)	PHB024 PHB030	PHB036	PHB042 PHB048 PHB060
A	31 1/8	31 1/8	33 5/8
B	52	52	55 3/8
C	38 3/4	43 3/4	58 1/8
D	13 3/8	16 3/8	24 5/8
E	18 3/8	20 3/8	26 5/8
F	15	15	17
G	15 1/4	15 1/4	17 1/4
H	13 3/4	16 3/4	25
I	18 3/4	20 3/4	27
K	30	30	32 1/2
L	16 3/8	18 3/8	27 3/4
O	12 3/8	12 3/8	14 7/8

INTRODUCTION

WARNING: DO NOT CONNECT TO OR USE IN CONJUNCTION WITH THIS UNIT ANY DEVICES FOR THE PURPOSE OF SAVING ENERGY OR INCREASING OPERATING EFFICIENCIES, WHICH HAVE NOT BEEN TESTED AND APPROVED BY US OR DESIGN CERTIFIED FOR USE WITH THIS UNIT. SERIOUS DAMAGE, REDUCED UNIT PERFORMANCE AND HAZARDOUS CONDITIONS MAY RESULT FROM THE USE OF DEVICES WHICH HAVE NOT BEEN APPROVED OR CERTIFIED.

This booklet contains the installation and operating instructions for your packaged air conditioning or heat pump unit. There are a few precautions that should be taken to derive maximum satisfaction from it. Improper installation can result in unsatisfactory operation or dangerous conditions and void the warranty. Read this booklet and any instructions packaged with accessories prior to installation. Give this booklet to the user and explain its provisions. The user should retain this booklet for future reference.

CHECKING PRODUCT RECEIVED

Upon receiving the unit, inspect it for any damage from shipment. Claims for damage, either shipping or concealed, should be filed immediately with the shipping company. Check the unit model number, specifications, electrical characteristics, and accessories to determine if they are correct.

I. SPECIFICATIONS

A. GENERAL

These Combination Package Cooling or Heat Pump Rooftops are available in cooling capacities of 2, 2.5, 3, 3.5, 4, and 5 nominal tons of cooling. Optional field installed heat kits are available in 5, 8, 10, 15 and 20 KW Units are convertible from end supply and return to bottom supply and return by relocation of cap panels. See cover installation detail.

The units are weatherized for mounting outside of the building. **Units are not to be installed inside the structure. These models are designed for OUTDOOR USE ONLY.**

The information on the rating plate is in compliance with the FTC and DOE rating for single phase units in the U.S.A.. The following information is for three phase units which **are not** covered under the DOE certification program in the U.S.A.

1. The efficiency rating of this unit is a product thermal efficiency rating determined under continuous operating conditions independent of any installed system.

IMPORTANT: The United States Environmental Protection Agency (EPA) has issued various regulations regarding the introduction and disposal of refrigerants in this unit. Failure to follow these regulations may harm the environment and can lead to the imposition of substantial fines. Because these regulations may vary due to the passage of new laws we suggest that any work on this unit be done by a certified technician. Should you have any questions please contact the local office of the EPA.

B. MAJOR COMPONENTS

The unit includes a hermetically-sealed refrigerating system (consisting of a compressor, condenser coil, evaporator coil with flowrator assembly), an indoor blower, a condenser fan, and all necessary internal electrical wiring. The heat pump also includes a reversing valve, solenoid and defrost thermostat and control. The cooling system of these units is factory-evacuated, charged and performance tested. Refrigerant amount and type are indicated on rating plate.

II. INSTALLATION

A. GENERAL

1a. **INSTALLATION** — This product is designed and manufactured to permit installation in accordance with National Codes. It is the installer's responsibility to install the product in accordance with National Codes and/or prevailing local codes and regulations.

1b. **PRE-INSTALLATION CHECK-POINTS** -- Before attempting any installation, the following points should be considered:

- Structural strength of supporting members
(Rooftop installation)
- Clearances and provision for servicing
- Power supply and wiring
- Air duct connections
- Drain facilities and connections
- Location for minimum noise

2a. LOCATION — These units are designed for outdoor installations. They can be mounted on a slab or rooftop. They are not to be installed within any part of a structure such as an attic, crawl space, closet or any other place where condenser air flow is restricted or other than outdoor ambient conditions prevail. **IMPORTANT: DO NOT PLACE UNIT UNDER THE HOME.** The location of the unit should be based on thorough consideration of the PRE-INSTALLATION CHECK POINTS.

2b. Heat Pumps require special location consideration in areas of heavy snow accumulation and / or areas with prolonged continuous subfreezing temperatures. Heat pump unit have cutouts by the U-formed coil to permit drainage of frost accumulation. Units must be situated to permit free unobstructed drainage of the frost water and ice.

2c. CLEARANCE - Condenser air enters from two sides. Air discharges from the top of the unit. Clearances around the unit must be maintained. (SEE FIGURE 7). We assume the top of the unit is completely unobstructed. If units are to be located under an overhang, there should be a minimum of 60" clearance and provisions made to deflect the warm discharge air out from the overhang. Additionally, the unit must be situated to permit access for service.

B. SLAB INSTALLATION

(Typical slab installation is shown in Figure 7.)

1. Select a location where external water drainage cannot collect around unit.
2. Provide a level concrete slab (min. flush with all four sides of the unit). The slab should be isolated from the foundation wall. Insure that there is no obstruction to condenser air by fences, shrubs, etc.
3. The location of the unit should be situated in such a manner to provide proper access for inspection and servicing.
4. Bottom rails are supplied for slab installation.

C. ROOFTOP INSTALLATION

1. Before locating the unit on the roof, make sure that the strength of the roof and beams is adequate at the point to support the weight involved. This is very important and installers responsibility. The following list shows approximate weight of unit.

TABLE 2

SIZE	WEIGHT (LB.)
2 TON	360
2 1/2 TON	365
3 TON	385
3 1/2 TON	450
4 TON	475
5 TON	510

2. Roof curb details see Figures 4 & 6.
3. The unit should be placed on a solid level platform of adequate strength. The mounting structure must be constructed as to support the unit a minimum of 3" above the roof deck. An angle iron stand of proper strength may be used to provide level support for the unit. See Figure 5 for unit bottom rail configurations.
4. The location of the unit on the roof should be such as to provide proper access for inspection and servicing.

FOR OUTDOOR INSTALLATION ONLY

D. DUCTING

Duct work should be fabricated by the installing contractor in accordance with local codes. Industry manuals may be used as a guide when sizing and designing the duct system — such as NESCA (National Environmental Systems Contractors Association, 1501 Wilson Blvd., Arlington, Virginia 22209).

DONOT, UNDER ANY CIRCUMSTANCES, CONNECT DUCT WORK TO ANY OTHER HEAT PRODUCING DEVICE SUCH AS FIREPLACE INSERT, STOVE, ETC. UNAUTHORIZED USE OF SUCH DEVICES MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY OR PROPERTY DAMAGE.

This unit should be placed as close to the space to be air conditioned as possible. Adequate clearance must be maintained as indicated in Section F "Clearances". Ducts should be run as directly as possible to supply and return outlets. Use of non-flammable weatherproof flexible connectors on both supply and return connections at unit to reduce noise transmission is recommended.

It is preferable to install the unit on the roof of the structure if the registers or diffusers are located on the wall or in the ceiling. A slab installation could be considered when the registers are low on a wall or in the floor.

On duct work exposed to outside air conditions of temperature and humidity, use a minimum of 2" of insulation with a good R factor, and vapor barrier. Distribution system in attic furred space, or crawl space should be insulated with at least 2" of insulation. 1/2" to 2" thickness of insulation is usually sufficient for duct work inside the air conditioned space.

Balancing dampers should be provided for each branch duct in the supply system. Duct work should be properly supported from the structure.

E. FILTERS

Filters are not provided with unit, and must be supplied and installed in the return air system by the installer. A field installed filter grille is recommended for easy and convenient access to the filters, for periodic inspection and cleaning. Filters must have adequate face area for the rated air quantity of the unit. See table 3 for recommended filter size.

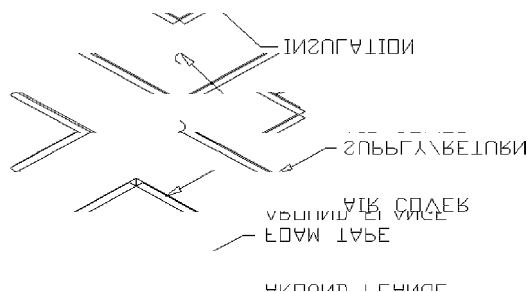
UNIT	2 Ton	2 1/2 Ton	3 Ton	3 1/2 / 4 Ton	5 Ton
Min. Filter Size	(1)20 x 20 x 1	(1)20 x 25 x 1	(1)25 x 25 x 1	(2)20 x 20 x 1	(2)20 x 25 x 1

TABLE 3

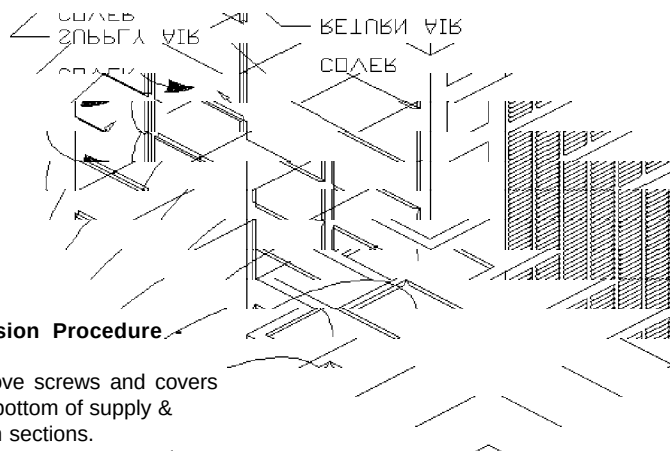
F. CLEARANCES

The following minimum clearances must be observed for proper unit performance and serviceability.

1. Provide 60" minimum clearance between top of unit and maximum 3 foot overhang.
2. Unit is design certified for application on combustible flooring with base rails in place as shown on Figure 5.
3. See Figure 7 for illustration of minimum installation combustible material clearances.
4. The unit may be installed directly on wood flooring or on (Class A, Class B, or Class C, in U.S.A.) roof covering materials if the bottom rails are in place.



COVER GASKET DETAIL



Conversion Procedure

1. Remove screws and covers from bottom of supply & return sections.
2. Using covers as a template drill 1/8" dia. holes in unit front around duct openings.

FIGURE 9

IMPORTANT NOTE:

When casing panels, other than access panels, are removed for service, any insulation that is damaged or torn must be replaced by identical material.

III. PIPING

CONDENSATE DRAIN

The condensate drain connection of the evaporator is a half coupling of 3/4" N.P.T. A trap must be provided to have proper condensate drainage.



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To wire units, make the following high and low voltage connections at either location.

1. High Voltage Wiring:

Single phase

Two leads should be connected to terminals L1 and L2 in the electrical control section, using wire sizes specified in wiring table.

Three phase

Three leads should be connected to terminals L1, L2, and L3 in the electrical control section, using wire sizes specified in wiring table.

2. Low Voltage Wiring:

Connect 24 V. wires from the thermostat to the corresponding wires in control box using No. 18 AWG as follows:

LEAD	THERMOSTAT	NOTES
RED	R (24V)	-
GREEN	G (FAN)	-
YELLOW	Y1 (1st STAGE COOL & HEAT)	-
PINK	Y2 (2nd STAGE COOL)	ONLY WHEN ECONOMIZER IS UTILIZED
ORANGE	O (REVERSING VALVE)	REVERSING VALVE IS ENERGIZED IN COOLING
WHITE	W2 (2nd STAGE HEAT)	REMOVE CONNECTION BETWEEN W2 & W3
BROWN	W3 (3rd STAGE HEAT)	FOR ELECTRIC HEAT STAGING
BLACK	B (ECON. LOCK OUT)	ONLY WHEN ECONOMIZER IS UTILIZED

TABLE 4

3. Internal Wiring

A diagram of the internal wiring of this unit is located under the electrical box cover. If any of the original wire as supplied with the appliance must be replaced, the wire gauge and insulation must be same as original wiring.

4. Transformer is factory wired for 230 volts on 208/230 volt models. See wiring diagram for 208 volt wiring. For 208V operation, move the white transformer lead from 240V to 208V tap.

TABLE 5
BRANCH CIRCUIT (UNIT ONLY)

SUPPLY WIRE TW (60 C) LENGTH - FEET	200	6	4	4	4	3	3	2	2
	150	8	6	6	4	4	4	3	3
	100	10	8	8	6	6	6	4	4
	75	12	10	8	8	6	6	4	4
	50	14	12	18	10	8	8	6	6
		15	20	25	30	35	40	45	50
BRANCH CIRCUIT AMPACITY									

NOTE: (Wiring for unit only, no heat kit installed)

1. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from Table 5 using the circuit ampacity found on the unit rating plate. From the unit disconnect to unit, the smallest wire size allowable in Table 5 may be used, **as the disconnect must be in sight of the unit.**

2. Wire size based on 60°C rated wire insulation and 30°C Ambient Temp. (86°F).

3. For more than 3 conductors in a raceway or cable, see the N.E.C. for derating the ampacity of each conductor.

TABLE 6
BRANCH CIRCUIT (SINGLE POINT CONNECTION)

				PHB	HKB	TOTAL	MAX.		*WIRE SIZE	
MODEL	VOLTS	PH	HZ	MIN. AMP.	MIN. AMP.	MIN. AMP.	O.P.	THW (75 C)	THHN (90 C)	**CONDUIT
PHB024-1 / HKB05-1	208/230	1	60	17.1	25	42.1	50	8	8	3/4
PHB024-1 / HKB08-1	208/230	1	60	17.1	38	55.1	60	6	8	1
PHB024-1 / HKB09-1	208/230	1	60	17.1	50	67.1	70	4	6	1-1/4
PHB030-1 / HKB05-1	208/230	1	60	22.8	25	47.8	60	8	8	3/4
PHB030-1 / HKB08-1	208/230	1	60	22.8	38	60.8	70	6	6	1
PHB030-1 / HKB09-1	208/230	1	60	22.8	50	72.8	80	4	6	1-1/4
PHB036-1 / HKB05-1	208/230	1	60	27.4	25	52.4	70	6	8	1
PHB036-1 / HKB08-1	208/230	1	60	27.4	38	65.4	80	6	6	1-1/4
PHB036-1 / HKB09-1	208/230	1	60	27.4	50	77.4	90	4	4	1-1/4
PHB036-3 / HKB09-3	208/230	3	60	22.7	29	51.7	60	6	8	1
PHB042-1 / HKB10-1	208/230	1	60	33.0	50	83.0	100	4	4	1-1/4
PHB042-1 / HKB15-1	208/230	1	60	33.0	75	108.0	120	2	3	1-1/4
PHB042-1 / HKB20-1	208/230	1	60	33.0	100	133.0	150	1/0	1	1-1/2
PHB048-1 / HKB10-1	208/230	1	60	35.4	50	85.4	100	3	4	1-1/4
PHB048-1 / HKB15-1	208/230	1	60	35.4	75	110.4	130	2	2	1-1/4
PHB048-1 / HKB20-1	208/230	1	60	35.4	100	135.4	150	1/0	1	1-1/2
PHB048-3 / HKB10-3	208/230	3	60	25.0	29	54.0	60	6	8	1
PHB048-3 / HKB15-3	208/230	3	60	25.0	44	69.0	80	4	6	1-1/4
PHB060-1 / HKB10-1	208/230	1	60	39.6	50	89.6	110	3	4	1-1/4
PHB060-1 / HKB15-1	208/230	1	60	39.6	75	114.6	130	2	2	1-1/4
PHB060-1 / HKB20-1	208/230	1	60	39.6	100	139.6	160	1/0	1	1-1/2
PHB060-3 / HKB10-3	208/230	3	60	30.8	29	59.8	70	6	6	1
PHB060-3 / HKB15-3	208/230	3	60	30.8	44	74.8	90	4	6	1-1/4

NOTE: (Wiring for single point location)

1. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run must be determined by the contractor using the circuit ampacity found in Table 6. From the unit disconnect to unit, the wire size shown in Table 6 may be used, as the disconnect must be in sight of the unit.
2. Wire sizes based on 75°C or 90°C rated wire insulation and 30°C Ambient Temp. (86°F).
3. For more than 3 conductors in a raceway or cable, see the N.E.C. for derating the ampacity of each conductor.

V. HEAT PUMP - OPERATION

A. START - UP PROCEDURE AND CHECK LIST

Begin with power turned off at all disconnects.

1. Turn thermostat system switch to "Cool", fan switch to "Auto" and turn temperature setting as high as it will go. Remove thermostat cover to allow observation of mercury bulb.
2. Inspect all registers and set them to the normal open position.
3. Turn on the electrical supply at the disconnect.
4. Turn the fan switch to the "ON" position. The blower should operate.
5. Turn the fan switch to "AUTO" position. The blower should stop.
6. Slowly lower the cooling temperature until the mercury bulb makes contact. The compressor, blower and fan should now be operating. Allow the unit to run 10 minutes, make sure cool air is being supplied by the unit.
7. Turn the temperature setting to the highest position, stopping the unit.
8. Turn the thermostat system switch to "OFF" and disconnect all power when servicing the unit.

HEAT PUMP START-UP PROCEDURE

9. Check the cooling mode for the heat pump in the same manner as above. The reversing valve is energized when the thermostat is placed in the cooling position. A clicking sound should be noticeable from the reversing valve. The contactor is energized by lowering the temperature setting to call for cooling. The compressor, blower and fan should then be running. After the cooling mode is checked out, turn the thermostat system switch to "OFF".
10. Turn the thermostat system switch to "HEAT" and fan switch to "AUTO".
11. Slowly raise the heating temperature setting. When the heating first stage mercury bulb (upper) makes contact, stop moving the lever. The compressor, blower and fan should now be running with the reversing valve in the de-energized (heating) position. After giving the unit time to settle out, make sure the unit is supplying heated air.

NOTE: The outdoor ambient must be above the set point of outdoor thermostat for the compressor to operate. It may be necessary to jumpers these thermostats to check compressor operation if outdoor ambient is cold.

12. If the outdoor ambient is above 80°F the unit may trip on its high pressure cutout when on heating. The compressor should stop. The heating cycle must be thoroughly checked, so postpone the test to another day when conditions are more suitable ... but - DO NOT FAIL TO TEST.

If the outdoor ambient is low and the unit operates properly on the heating cycle, you may check the pressure cutout operation by blocking off the indoor return air until the unit trips.

13. If unit operates properly on the heating cycle, raise the temperature setting until the heating second stage mercury bulb makes contact. The compressor will stop and gas fired heat will start. Make sure it operates properly.
14. For thermostats with emergency heat switch, return to step 11. The emergency heat switch is located at the bottom of the thermostat. Move the switch to emergency heat. The heat pump will stop, the blower will continue to run, gas fired heater will come on and the thermostat emergency heat light will come on.
15. If checking the unit in the wintertime, when the outdoor coil is cold enough to actuate the defrost control, observe at least one defrost cycle to make sure the unit defrosts completely.

FINAL SYSTEM CHECKS

16. Check to see if all supply and return air grilles are adjusted and the air distribution system is balanced for the best compromise between heating and cooling.
17. Check for air leaks in the ductwork.
18. Make sure the unit is free of “rattles”, and the tubing in the unit is free from excessive vibration. Also make sure tubes or lines are not rubbing against each other or sheet metal surfaces or edges. If so, correct the trouble.
19. Set the thermostat at the appropriate setting for cooling and heating or automatic changeover for normal use.

20. BE SURE THE OWNER IS INSTRUCTED ON THE UNIT OPERATION, FILTER, SERVICING, CORRECT THERMOSTAT OPERATION, ETC.

The fore mentioned “Start-up Procedure and Check List” is recommended to serve as an indication that the unit will operate normally.

B. OPERATION - GENERAL

COMPONENTS

1. **Contactors** - This control is activated (closed) by the room thermostat for both heating and cooling. The contactor has a 24 V coil and supplies power to the compressor and outdoor fan motor.
2. **Contactors Relay** - This control is activated by the thermostat (24V coil) and supplies power to the contactor.
3. **Compressor** - This item is activated by the contactor for heating and cooling except during emergency heat. It is protected by an internal overload.
4. **Crankcase Heater** - This item is on when ever power is supplied to the unit. It warms the compressor crankcase thereby preventing liquid migration and subsequent compressor damage. The heater is insert type and self regulating. It is connected electrically to the contactor L1 and L2 terminals. (If Applicable)
5. **Condenser motor** - This item is activated by the contactor during heating and cooling except during defrost and emergency heat operation.
6. **Evaporator Motor Time Delay Relay** - This control is activated by the thermostat (24V coil) and supplies power to the evaporator motor. The relay is a sequencer switch that delays (0 - 30 sec.) the evaporator motor on and (45 - 90 sec.) off.
7. **Evaporator Motor** - This item is activated by the evaporator motor relay in mechanical heating and cooling, and circulates the air throughout the conditioned space.
8. **Defrost Control** - The defrost control provides time/temperature initiation and termination of the defrost cycle. When a defrost cycle is initiated, the defrost control shifts the reversing valve to “cooling” mode, stops the outdoor fan and brings on supplemental heat. Normally, a defrost cycle will take only 2-3 minutes unless system is low on charge or outdoor conditions are severe. (Windy and cold)
9. **Outdoor Thermostat** - This control is used to prevent furnace operation at varying outdoor ambient (0°F to 60°F). They are normally open above their set points and closed below to permit operation of gas fired heating.
10. **Reversing Valve Coil** - This coil is activated by the thermostat being switched to cool, and during defrost. It positions the reversing valve pilot valve for cooling operation.

C. EXPLANATION AND GUIDANCE (HEAT PUMP)

The heat pump is a relatively simple device. It operates exactly as a Summer Air Conditioner unit when it is on the cooling cycle. Therefore, all the charts and data for service that apply to summer air conditioning apply to the heat pump when it is on the cooling cycle, and most apply on the heating cycle except that “condenser” becomes “evaporator”, “evaporator” becomes “condenser”, “cooling” becomes “heating”.

When the heat pump is on the heating cycle, it is necessary to redirect the refrigerant flow through the refrigerant circuit external to the compressor. This is accomplished with a reversing valve. Thus, the hot discharge vapor from the compressor is directed to the indoor coil (evaporator on the cooling cycle) where the heat is removed, and the vapor condenses to liquid. It then goes through the expansion device to the outdoor coil (condenser on the cooling cycle) where the liquid is evaporated, and vapor goes to the compressor.

When the solenoid valve is operated either from heating to cooling or vice versa, it moves the piston in the reversing valve to the low pressure side and reverses the flow of refrigerant in the circuits. Thus, suction pressure (low pressure) and discharge pressure (high pressure) reverse positions in the reversing valve.

The following figures show a schematic of a heat pump on the cooling cycle and the heating cycle.

Heat Pump Refrigerant Circuit

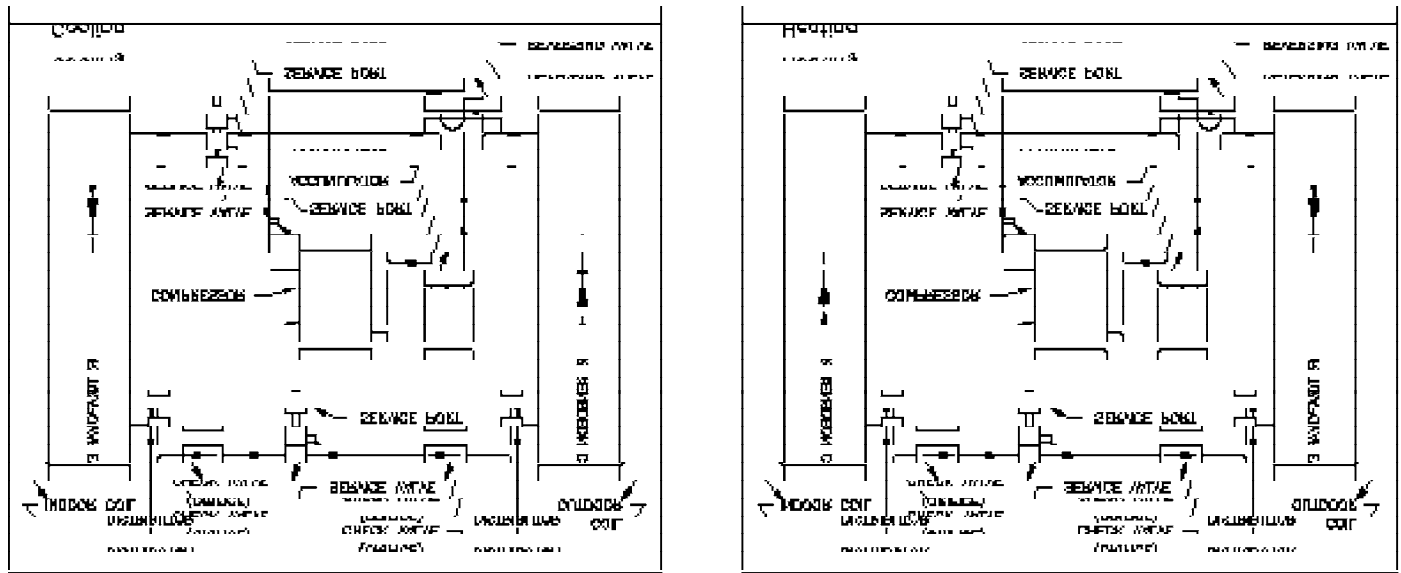


Figure 13

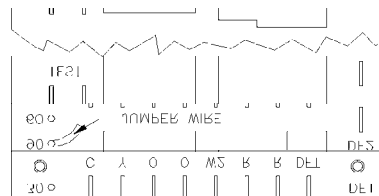
In addition to a reversing valve, a heat pump is equipped with an expansion device and check valve for the indoor coil, and similar equipment for the outdoor coil. It is also provided with a defrost control system.

The expansion devices are flowrator distributors and perform the same function on the heating cycle as on the cooling cycle. The flowrator distributors also act as check valves to allow for the reverse of refrigerant flow.

When the heat pump is on the heating cycle, at which time the outdoor coil is functioning as an evaporator, the temperature of the refrigerant in the outdoor coil must be below the temperature of the outdoor air in order to extract heat from the air. Thus, the greater the difference in the outdoor temperature and the outdoor coil temperature, the greater the heating capacity of the heat pump. Since these are the characteristics of a heat pump, it is a good practice to provide supplementary heat for all heat pump installations in areas where the temperature drops below 45°F. It is also good practice to provide sufficient gas fired heat to handle the entire heating requirement if there should be a failure of the heat pump, such as a compressor, or refrigerant leak, etc.

D. DEFROST CONTROL

During operation the power to the circuit board is controlled by a temperature sensor which is clamped to a feeder tube entering the outdoor coil. Defrost timing periods of 30, 60 and 90 minutes may be selected by connecting the circuit board jumper to 30, 60 and 90 respectively (See Figure 14). Accumulation of time for the timing period selected starts when the sensor closes (approximately 28°F), and when the wall thermostat calls for heat. At the end of the timing period, a defrost cycle will be initiated provided the sensor remains closed. When the sensor opens (approximately 65°F), the defrost cycle is terminated and the timing period is reset. If the defrost cycle is not terminated due to the sensor temperature, a ten minute override interrupts the defrost period.



SUGGESTED FIELD TESTING/TROUBLE SHOOTING

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TROUBLESHOOTING CHART

WARNING : DISCONNECT ALL POWER TO UNIT BEFORE SERVICING.

SYMPTOM	POSSIBLE CAUSE	REMEDY
High head - low suction	a. Restriction in liquid line or capillary tube	a. Remove or replace defective components
High head - high or normal suction	a. Dirty condenser coil b. Overcharged c. Condenser fan not running	a. Clean coil b. Correct System charge c. Repair or Replace
Low head - high suction	a. Incorrect capillary tube b. Defective compressor valves	a. Replace evaporator assembly b. Replace compressor
Unit will not run	a. Power off or loose electrical connection b. Thermostat out of calibration set too high c. Defective contactor d. Blown fuses or tripped breaker e. Transformer defective f. High or low pressure control open (Optional) g. Compressor overload contacts open	a. Check for unit voltage at contactor in unit b. Reset c. Check for 24 volts at contactor coil replace if contacts are open d. Replace fuse or reset breaker e. Check wiring - replace transformer f. Reset high pressure control or check unit charge High pressure control opens at 425 psi Low pressure control opens at 25 psi g. Replace compressor NOTE: Wait at least 2 hours for overload to reset
Condenser fan runs, compressor doesn't	a. Loose connection b. Compressor stuck, grounded or open winding Open internal overload c. Low voltage connection	a. Check for unit voltage at compressor check & tighten all connections b. Wait at least 2 hours for overload to reset If still open, replace the compressor c. At compressor terminals, voltage must be within 10 % of nameplate volts when unit is operating
Low suction - cool compressor Iced evaporator coil	a. Low indoor airflow	a. Increase speed of blower or reduce restriction - replace air filters
Compressor short cycles	a. Defective overload protector b. Unit cycling on low pressure control	a. Replace - check for correct voltage b. Check refrigerant charge and / or airflow
Registers sweat	a. Low airflow	a. Increase speed of blower or reduce restriction Replace air filters
High suction pressure	a. Excessive load b. Defective compressor	a. Recheck load calculation b. Replace
Insufficient cooling	a. Improperly sized unit b. Improper airflow c. Incorrect refrigerant charge d. Incorrect voltage	a. Recalculate load b. Check - should be approximately 400 CFM per ton c. Charge per procedure attached to unit service panel d. At compressor terminals, voltage must be within 10% of nameplate volts when unit is operating
Evaporator coil freezing or frosting	a. Low airflow b. Low refrigerant charge c. Operating unit in cooling mode below 65°F outdoor temperature	a. Check - should be approximately 400 CFM per ton, dirty air filters, all duct outlets open b. Properly charge unit c. Install or check low ambient control, should be open below 65°F outdoor temperature